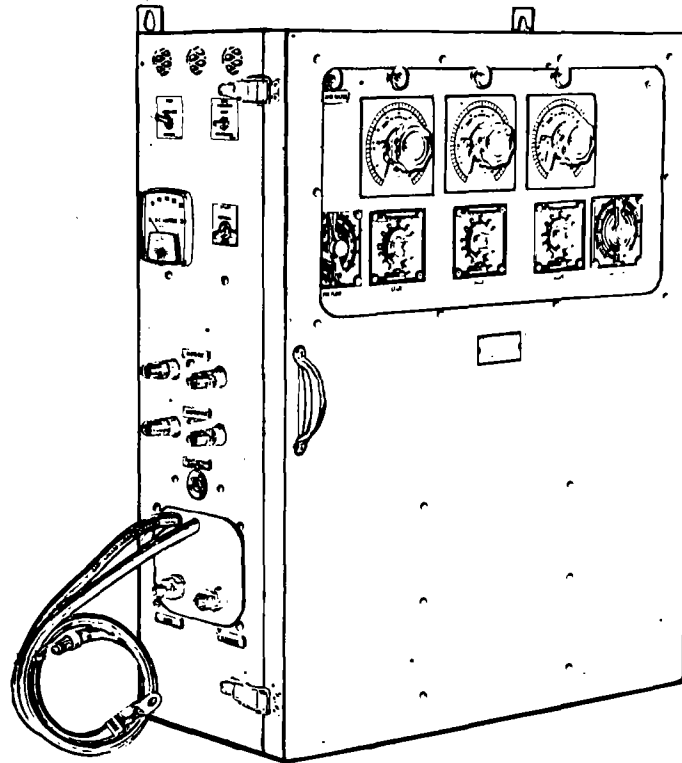


September 1973

FORM: OM-540

Effective with serial No. 71-576983



MODEL	STOCK NO.
SCE-1A	040 105
SCE-2A	040 107
SCE-3A	040 109
SCE-5A	040 256
SCM-1A	040 104
SCM-2A	040 106
SCM-3A	040 108
SCM-5A	040 255

MODEL/STOCK NO.	SERIAL/STYLE NO.	DATE PURCHASED

OWNER'S MANUAL



MILLER ELECTRIC MFG. CO.
APPLETON, WISCONSIN, USA 54911

NWSA CODE NO. 4579

PRINTED
IN
U.S.A.

ERRATA SHEET

After this manual was printed, refinements in equipment design occurred. This sheet lists exceptions to data appearing later in this manual.

Item No.	Dia. Mkgs.	Part No. Listed In Parts List	Replaced With Part No.	Description	Quantity
14	W	034 820	034 909	CONTACTOR, size 1-3/4 4 pole (Eff with S/N HE801243)...	1
16	GS,WS	035 601	003 538	VALVE (Eff with S/N HF854924)	1
		033 050	003 539	COIL, valve 115 volts ac (Eff with S/N HF854924)	1
17	RC1	039 602	035 493	RECEPTACLE, grounded-twistlock 3P3W (Eff with S/N HE793827)	1
19		012 602	012 640	HOLDER, fuse-plug	1
41		033 410	034 910	COIL, contactor 115/230 volts (Eff with S/N HE801243)....	1
42		034 825	*034 911	KIT, point-contact (Eff with S/N HE801243)	4
99	C3	031 601	Deleted		
100		014 159	Deleted		
			081 291	CAPACITOR, HF (consisting of)	1
	C3		059 887	CAPACITOR, metalfilm 10 uf 220 volts	1
			007 532	CLAMP, capacitor 1 inch dia	2

*Recommended Spare Parts

BE SURE TO PROVIDE MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.



CERTIFICATE

NAME OF EQUIPMENT: _____ MODEL NO. _____

SERIAL NO. _____ DATE _____

This equipment has been type-tested under standardized field test conditions as recommended by the Joint Industry Committee on High Frequency Stabilized Arc Welding Machines found to radiate less than 10 microvolts per meter at a distance of one mile, the maximum allowable limit established by the Federal Communications Commission for equipment of this type.

Installations using this equipment on the basis of these tests, may reasonably be expected to meet the radiation limitations established by the Federal Communications Commission, only when installed, operated and maintained as specified in the instruction book provided.

USER'S CERTIFICATION

The welding equipment identified above has been installed in accordance with the specific instructions applicable to this model as outlined in the instruction book furnished. It is being used only for the purpose for which it was intended and is being maintained and operated in accordance with the manufacturer's instructions.

Date Installed _____ Signed _____

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SECTION 1 - INTRODUCTION

Dimensions (Inches)			Weight (Pounds)	
Height	Width	Depth	Net	Shipping
33-1/4	26-1/4	10-5/8	168	230

Figure 1-1. Specifications

1-1. GENERAL

This manual has been prepared especially for use in familiarizing personnel with the design, installation, operation, maintenance, and troubleshooting of this equipment. All information presented herein should be given careful consideration to assure optimum performance of this equipment.

1-2. RECEIVING-HANDLING

Prior to installing this equipment, clean all packing material from around the unit and carefully inspect for any damage that may have occurred during shipment. Any claims for loss or damage that may have occurred in transit must be filed by the purchaser with the carrier. A copy of the bill of lading and freight bill will be furnished by the carrier on request if occasion to file claim arises.

When requesting information concerning this equipment, it is essential that Model Designation and/or Stock Number and Serial (or Style) Number of the equipment be supplied.

1-3. DESCRIPTION

These Sequence Controls are specifically designed to be used in conjunction with an electric current controlled welding power source. These Sequence Controls provide five different sequences for either automatic or semi-automatic operation of the various welding processes. The function of each sequence is described in Section 3, Function of Control, in this manual. The SCE Models are equipped with electronic timers in sequences B, C, and D. The SCM Models are equipped with mechanical timers in sequences B, C, and D.

1-4. SAFETY

Before the equipment is put into operation, the safety section at the front of this manual should be read completely. This will help avoid possible injury due to misuse or improper welding applications.

The following definitions apply to CAUTION, IMPORTANT, and NOTE blocks found throughout this manual:

CAUTION

Installation, operating, and maintenance procedures, practices, etc., which will result in personnel injury or loss of life if not carefully followed.

IMPORTANT

Installation, operating, and maintenance procedures, practices, etc., which will result in damage to equipment.

NOTE

Installation, operating, and maintenance procedures, practices, etc., which it is essential to emphasize.

SECTION 2 - INSTALLATION

2-1. PRIMARY CONNECTIONS

Refer to the Installation Section (Primary Connection paragraph) of the welding power source Installation, Operation and Maintenance Manual for connecting the primary power supply to the welding power source.

On the SCE/SCM-1A, 2A and 3A Models, inside the cabinet on the lower right corner above the control transformer, is either a three or a five pole terminal block with one jumper link attached. The primary power supply to the Sequence

Control is connected to this block. The jumper link must be connected for the primary power supply voltage that will correspond with the primary power supply voltage of the welding power source. Refer to Figure 2-1 for positioning of the link for the required operating voltage.

On the SCE/SCM-5A the control transformer which provides the primary power to the control is located in the welding power source.

2-2. SECONDARY CONNECTIONS (Figure 2-2)

Refer to the Installation Section (Secondary Connection paragraph) of the welding power source Installation, Operation and Maintenance Manual for proper weld cable size.

The secondary terminals on the Sequence Control are labeled ELECTRODE and WORK. Connect the electrode holder cable to the terminal marked ELECTRODE and the work cable to the terminal marked WORK.

2-3. SHIELDING GAS CONNECTIONS (Figure 2-2)

These connections are located on the front panel and are labeled IN-GAS-OUT. The connections have a right hand, 5/8-18 female thread. Connect the hose from the shielding gas supply to the connection labeled IN. Connect the hose from the electrode holder to the connection labeled OUT.

2-4. WATER CONNECTIONS (Figure 2-2)

These connections are located on the front panel and are labeled IN-WATER-OUT. The connections have a left hand, 5/8-18 female thread. Connect the hose from the water supply to the connection labeled IN. Connect the hose from the electrode holder to the connection labeled OUT.

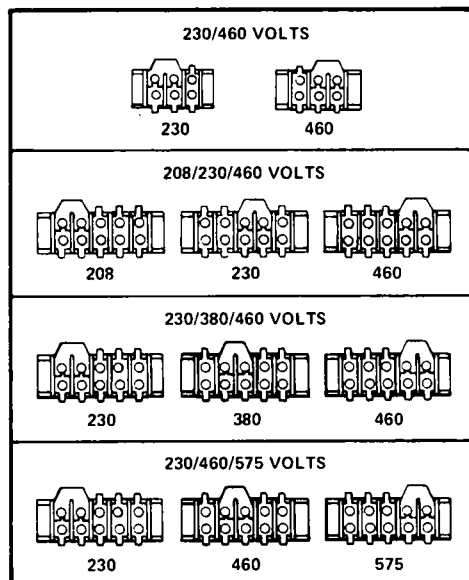


Figure 2-1. Line Voltage Jumper Link Arrangement

IMPORTANT

If a portable water coolant system is used, do not make the above connections, as possible damage could occur to the coolant system motor.

2-5. CONTACTOR CONTROL RECEPTACLE (Figure 2-2)

This two prong, twistlock receptacle, provides contactor control facilities. Either a remote hand or foot switch can be used. A two prong, twistlock plug, is supplied with the Sequence Control.

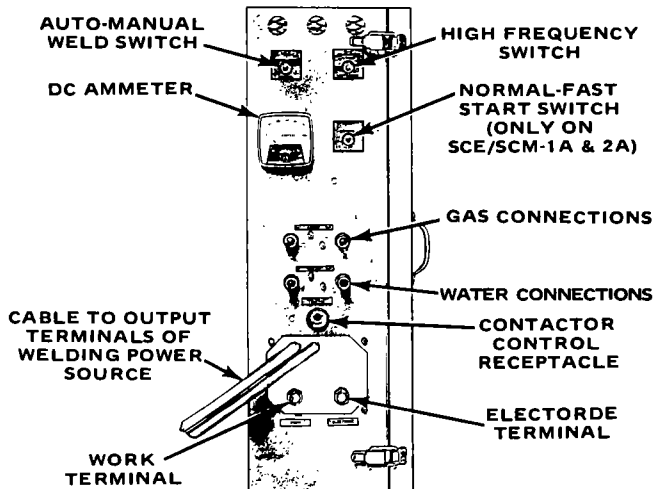


Figure 2-2. Front Panel View

TA-040 107-2

2-6. EMERGENCY STOP SWITCH CONNECTIONS (Figures 2-3 and 3-2)

A five pole terminal block with two jumper links attached, located on the inside lower left corner of the cabinet, provides a means of emergency stop connections of weld sequences B, C, or D. If it is desirable to connect an emergency stop switch in the circuit, remove the jumper link that is connected across the fourth and fifth terminals counting left to right. Connect a normally closed switch to the terminals from which the link was removed.

With the AUTOMATIC-MANUAL Switch in the AUTOMATIC position, weld sequences B, C, or D may be interrupted at any time by opening the emergency stop switch. Opening of this switch will initiate sequence E (post-flow time).

2-7. MANUAL CONTROL CONNECTIONS OF SEQUENCE C (Figures 2-3 and 3-2)

A five pole terminal block, with two jumper links attached, located on the inside lower left corner of the cabinet, provides a means of external switch control of sequence C. To connect an external switch for manual control of sequence C, remove the jumper link connected across the first and second terminals counting left to right. Connect a normally open switch to the terminals from which the link was removed.

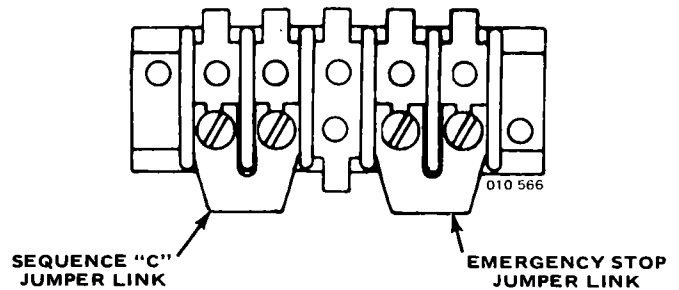


Figure 2-3. Terminal Block For External Switch Operation

TA-010 566

SECTION 3 - OPERATION

3-1. SEQUENCE CONTROL FUNCTION (Figure 3-1)

This Sequence Control is a five sequence automatic control, designed for Gas Tungsten-Arc Welding (GTAW). The function of each sequence is as follows:

Sequence A: Pre-flow of gas and water; adjustable mechanical time of 1/4 to 15 seconds.

Sequence B: Start-current; adjustable control and timer

pre-set magnitude of current and time.
Sequence C: Weld Current, adjustable control and timer provide exact values of current and time. Sequence can be manually controlled.
Sequence D: Final weld current; adjustable control and timer are pre-set to determine magnitude and time duration of current at end of weld.
Sequence E: Post-flow of gas and water, adjustable mechanical time sequence of 2 seconds to 3 minutes.

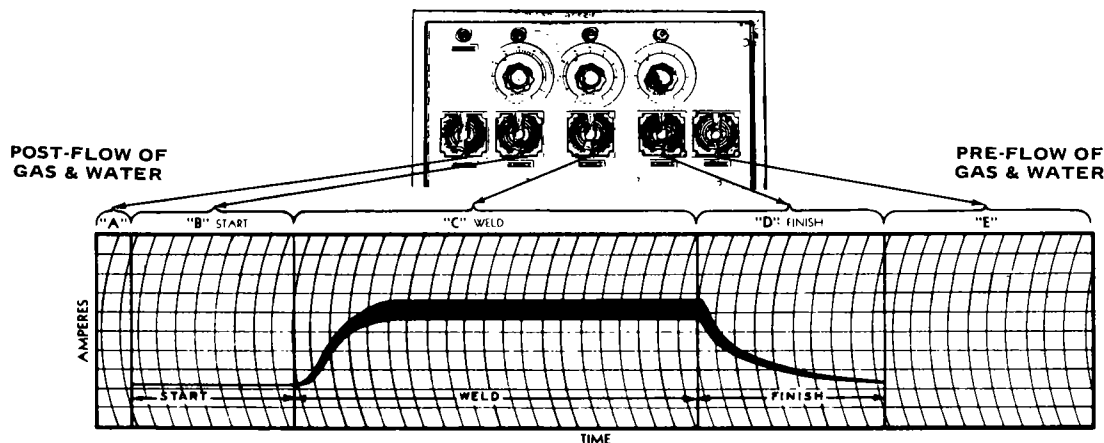


Figure 3-1. Sequence Time Chart

TA-040 107-6

3-2. CURRENT CONTROL (Figure 3-2)

The welding current for each sequence is governed by the setting of the three Amperage Controls which are labeled Start Weld Amperage Control (sequence B), Normal Weld Amperage Control (sequence C), and Slope Weld Amperage Control (sequence D). The control dials are calibrated in percent. These controls act as remote controls, in that they are fine current adjustment of the Fine Current Adjustment Controls on the welding power source. The STANDARD-REMOTE Amperage Control Switch on the welding power source must be in the STANDARD position.

NOTE

The Fine Current Adjustment Controls on the welding power source must be in the one hundred percent position for maximum control of the selected range.

A. Start Weld Amperage Control (Sequence B)

This control is provided for selecting the start weld current value. The control is adjustable and can be set for any value from the minimum to the maximum of the selected current range on the welding power source. For a normal start the control should be set for a value less than the normal weld (sequence C) setting.

B. Normal Weld Amperage Control (Sequence C)

This control is provided for selecting the normal weld current value. The control is adjustable and can be set for any value from the minimum to the maximum of the selected current range on the welding power source.

C. Slope Weld Amperage Control (Sequence D)

This control is provided for selecting the slope weld current value. The control is adjustable and can be set for any value from the minimum to the maximum of the selected current range on the welding power source. For a normal finish the control should be set for a value less than the normal weld (sequence C) setting.

3-3. NORMAL-FAST START SWITCH (SCE/SCM-1A and 2A)(Figure 2-2)

This switch provides a choice of selecting either a normal or a fast start of sequence B (start weld).

A. Normal Position

With the switch in the NORMAL position the starting current will start at a value less than the setting of the Start Weld Amperage Control, but will rapidly increase to the setting of the Start Weld Amperage Control.

B. Fast Position

With the switch in the FAST position the starting current will start at the value of the Start Weld Amperage setting.

3-4. AUTOMATIC-MANUAL SWITCH (Figure 2-2)

This switch provides a choice of selecting either an automatic or semi-automatic operation of the Sequence Control.

A. Automatic Position

With the switch in the AUTOMATIC position, the Sequence Control will operate automatically through all sequences with the use of a contactor control switch connected to the Contactor Control Receptacle.

B. Manual Position

With the switch in the MANUAL position, the timers of sequences B, C, and D are removed from the circuit. However, the weld sequence current value will be controlled by the normal Weld Amperage Control on the Sequence Control. Closing the contactor control switch will initiate sequence A. Upon completion of sequence A the weld sequence will be initiated automatically. The Sequence Control will continue to operate in the weld sequence until the contactor control switch is opened. Opening this switch will extinguish the weld sequence and initiate sequence E (post-flow gas and water time).

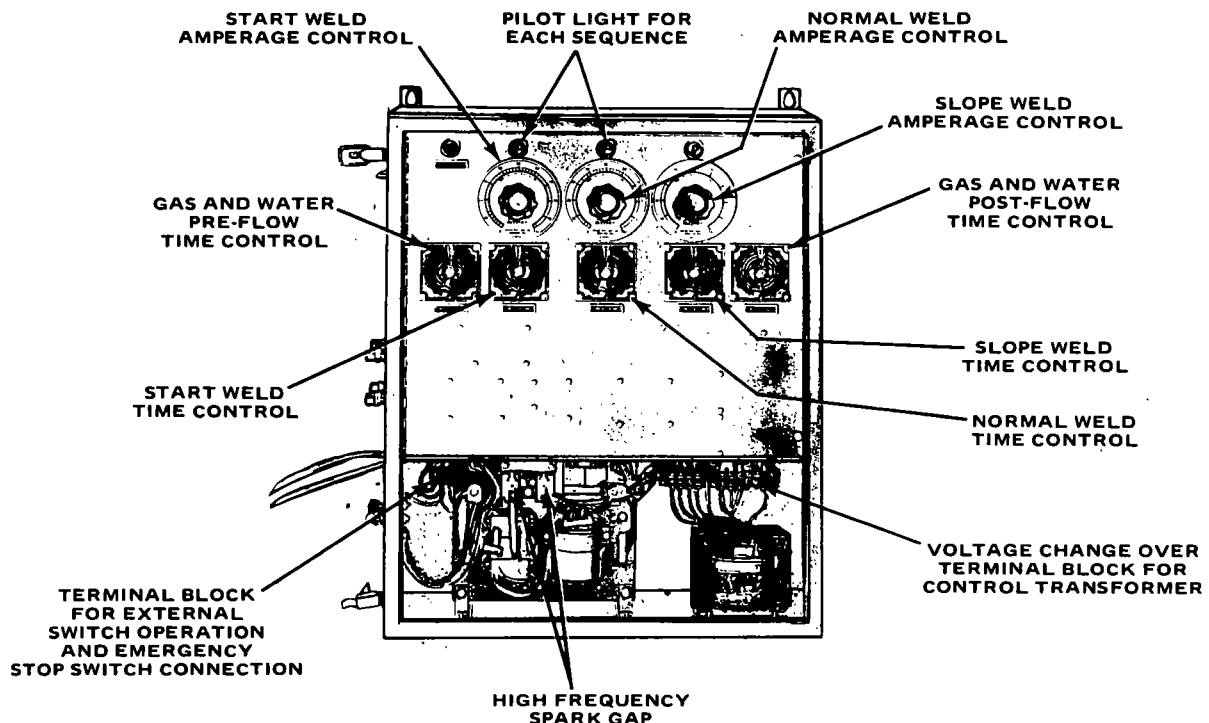


Figure 3-2. Control Panel View

3-5. MANUAL CONTROL OF SEQUENCE C

Provisions are provided for manual timing of sequence C to allow continuous welding for any desired time. This is accomplished by connecting an external switch into the circuit. Refer to paragraph 2-7 for information on connecting the external switch. The Sequence Control functions automatically through sequences A and B, but the time duration of sequence C is controlled by the external switch. Closing the external switch will extinguish sequence C and initiate the slope weld time (sequence D).

3-6. HIGH FREQUENCY CONTROL (Figure 2-2)

The high frequency is controlled through the Direct-Air coupling jumper links and the High Frequency Switch labeled START-OFF-CONTINUOUS.

A. Direct-Air Coupling

Located on each side of the high frequency panel are three terminals and one jumper link. The position of the links are labeled DIRECT and AIR. These links provide facilities for connecting the high frequency transformer for either direct or air coupling which governs the amount of high frequency

intensity. To increase the intensity connect both links in the position labeled DIRECT. To decrease the intensity connect both links in the position labeled AIR.

B. Off Position

With the switch in the OFF position, high frequency is removed from the weld circuit. This method is recommended for Shielded Metal-Arc Welding (SMAW).

C. Start Position

With the switch in the START position high frequency is induced into the weld circuit as an aid in starting the arc. When a welding arc is established the high frequency will automatically shut-off. This method is recommended for dc Gas Tungsten-Arc Welding (GTAW).

D. Continuous Position

With the switch in the CONTINUOUS position high frequency is induced into the weld circuit during all three welding sequences or as long as the contactor is energized. This method is recommended for AC Gas Tungsten-Arc Welding (GTAW).

SECTION 4 - SEQUENCE OF OPERATION

4-1. SHIELDED METAL-ARC WELDING (SMAW)

For Shielded Metal-Arc Welding, check and adjust the controls as follows:

1. Disconnect or shut-off the shielding gas and water supplies.
2. Check that secondary connections are as described in paragraph 2-2.
3. Determine the type of welding current required (AC, DCSP or DCRP) and position the Polarity Switch or Current Selector Switch on the welding power source accordingly.
4. Place the Current Range Switch on the welding power source in the desired current range.
5. Rotate the Fine Current Adjustment Control on the welding power source to the maximum position.
6. Rotate the Normal Weld Amperage Control (sequence C) on the Sequence Control for the approximate percentage of weld current desired within the range selected on the welding power source.
7. Place the Automatic-Manual Switch in the MANUAL position.
8. On SCE/SCM-1A and 2A Models, adjust the Start Weld Amperage Control to approximately the same setting of the Normal Weld Amperage Control setting.
9. On SCE/SCM-1A and 2A Models place the Normal-Fast Switch in the desired position according to the welding application.
10. Place the High Frequency Switch in the OFF position.
11. Connect a normally open switch into the Contactor Control Receptacle.
12. Place the On-Off Power Switch on the welding power source to the ON position.
13. Close the Contactor Control Switch and commence welding.
14. Readjust the controls as necessary for proper weld condition.

4-2. GAS TUNGSTEN-ARC WELDING (GTAW)

For Gas Tungsten-Arc Welding, check and adjust the controls as follows:

1. Check that shielding gas and water connections are as described in paragraphs 2-3 and 2-4.

2. Check that secondary connections are as described in paragraph 2-2.
3. Determine the type of welding current required whether (AC, DCSP or DCRP) and position the Polarity Switch or Selector Switch on the welding power source accordingly.
4. Place the Current Range Switch on the welding power source in the desired current range.
5. Rotate the Fine Current Adjustment Control on the welding power source to the maximum position.
6. Rotate the Start Weld Amperage Control, Normal Weld Amperage Control, and the Slope Weld Amperage Control on the Sequence Control to the desired setting.
7. Place the Automatic-Manual Switch in the MANUAL position.
8. On SCE/SCM-1A and 2A Models, place the Normal-Fast Switch in the desired position according to the welding application.
9. Place the High Frequency Switch in the START position for dc welding and in the CONTINUOUS position for ac welding.
10. Adjust the shielding gas and water pre-flow and post-flow timers for the desired time setting.

Table 4-1
Guide For Selecting Electrode For Gas Tungsten-Arc Welding

PURE TUNGSTEN Electrode Dia. (In.)	CURRENT RANGE		
	ACHF-Argon	DCSP-Argon	DCSP-Helium
.010	Up to 15	Up to 15	Up to 20
.020	10 to 30	15 to 50	20 to 60
.040	20 to 70	25 to 70	30 to 90
1/16	50 to 125	50 to 135	60 to 150
3/32	100 to 160	125 to 225	140 to 250
1/8	150 to 210	215 to 360	240 to 400
5/32	190 to 280	350 to 450	390 to 500
3/16	250 to 350	450 to 720	500 to 800
1/4	300 to 500	720 to 990	800 to 1100
1% AND 2% THORIATED TUNGSTEN			
.010	Up to 20	Up to 25	Up to 30
.020	15 to 35	15 to 50	20 to 60
.040	20 to 80	25 to 80	30 to 100
1/16	50 to 140	50 to 145	60 to 160
3/32	130 to 250	135 to 235	150 to 260
1/8	225 to 350	225 to 360	250 to 400
5/32	300 to 450	360 to 450	400 to 500
3/16	400 to 550	450 to 720	500 to 800
1/4	500 to 800	720 to 990	800 to 1100

11. Select the proper size tungsten for the welding application from Table 4-1.
12. Connect a normally open switch into the Contactor Control Receptacle.
13. Place the On-Off Power Switch on the welding power source to the ON position.
14. Close the contactor control switch and commence welding.
15. Readjust the controls as necessary for proper welding condition.

SCM-1A, 2A SCE-1A, 2A
SEQUENCE TIMER FLOW CHART

S 1 Switch in "Manual" Position
S 2 Switch in "Normal Start" Position
S 3 Switch in "Start" Position

p.u. - picks up
d.o. - drops out

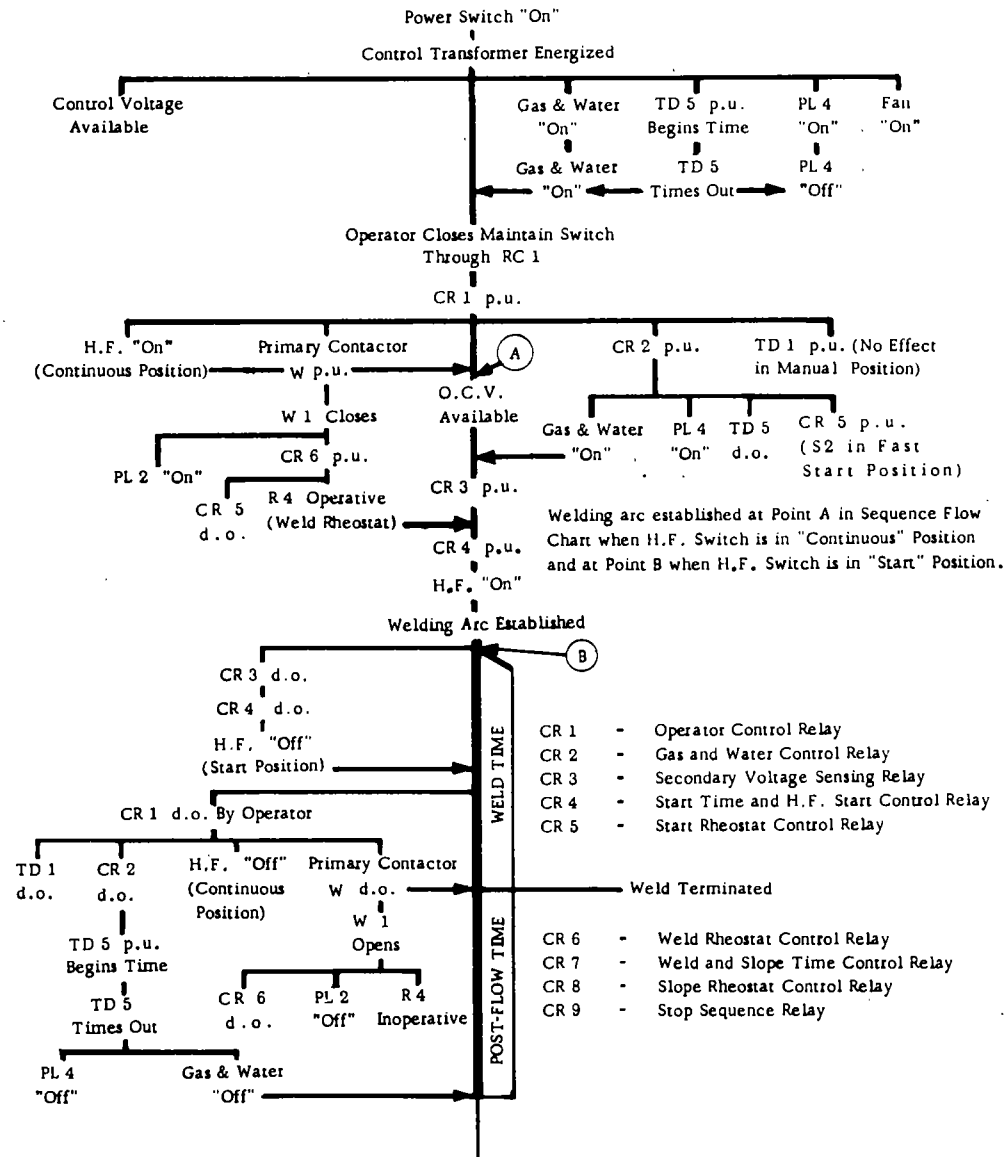


Figure 4-1. SCM/SCE-1A, 2A Sequence Flow Chart - S1 Manual Position

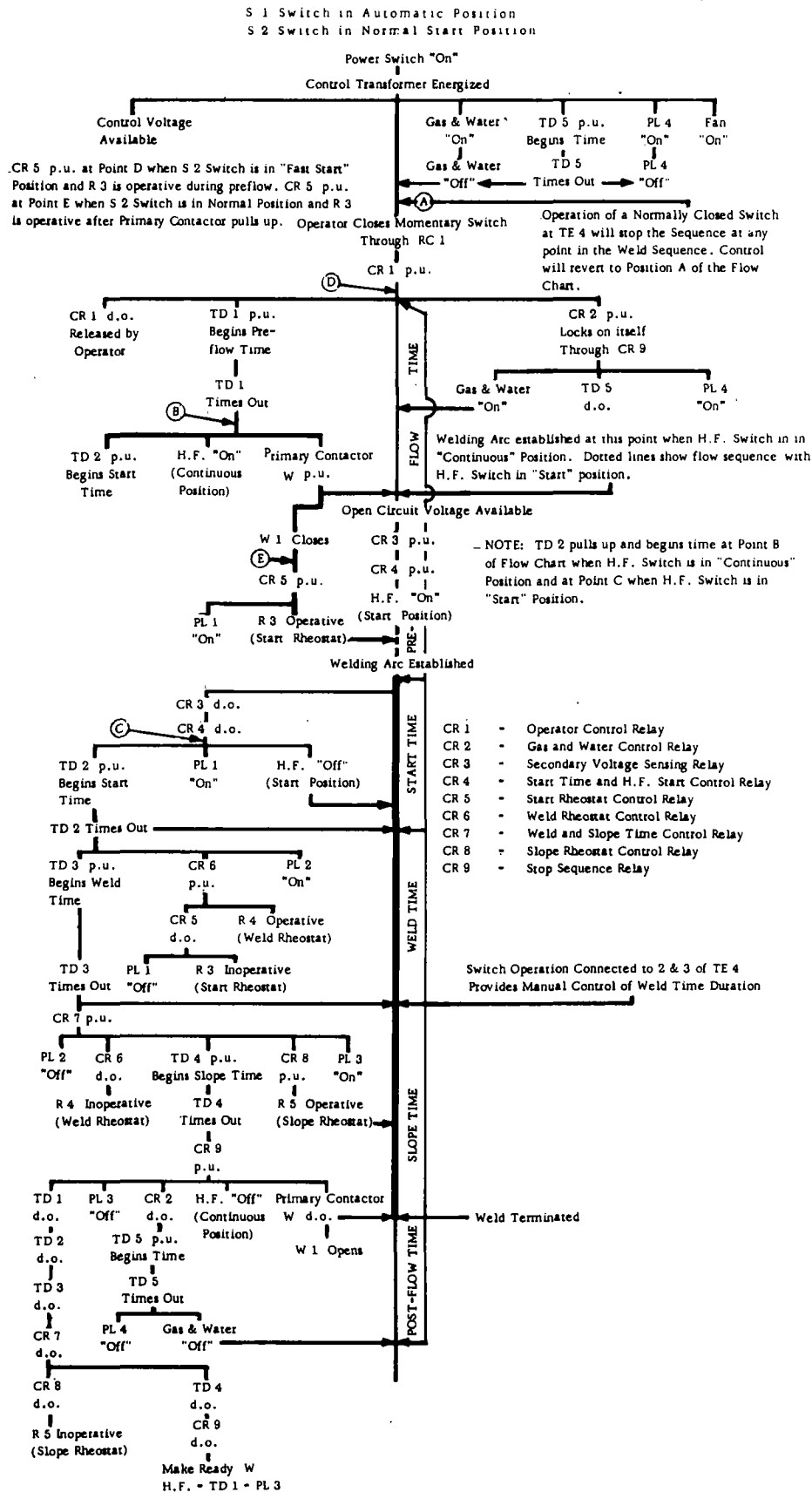


Figure 4-2. SCM/SCE-1A, 2A Sequence Flow Chart - S1 Automatic Position

SCM-3A SCE-3A
SEQUENCE TIMER FLOW CHART

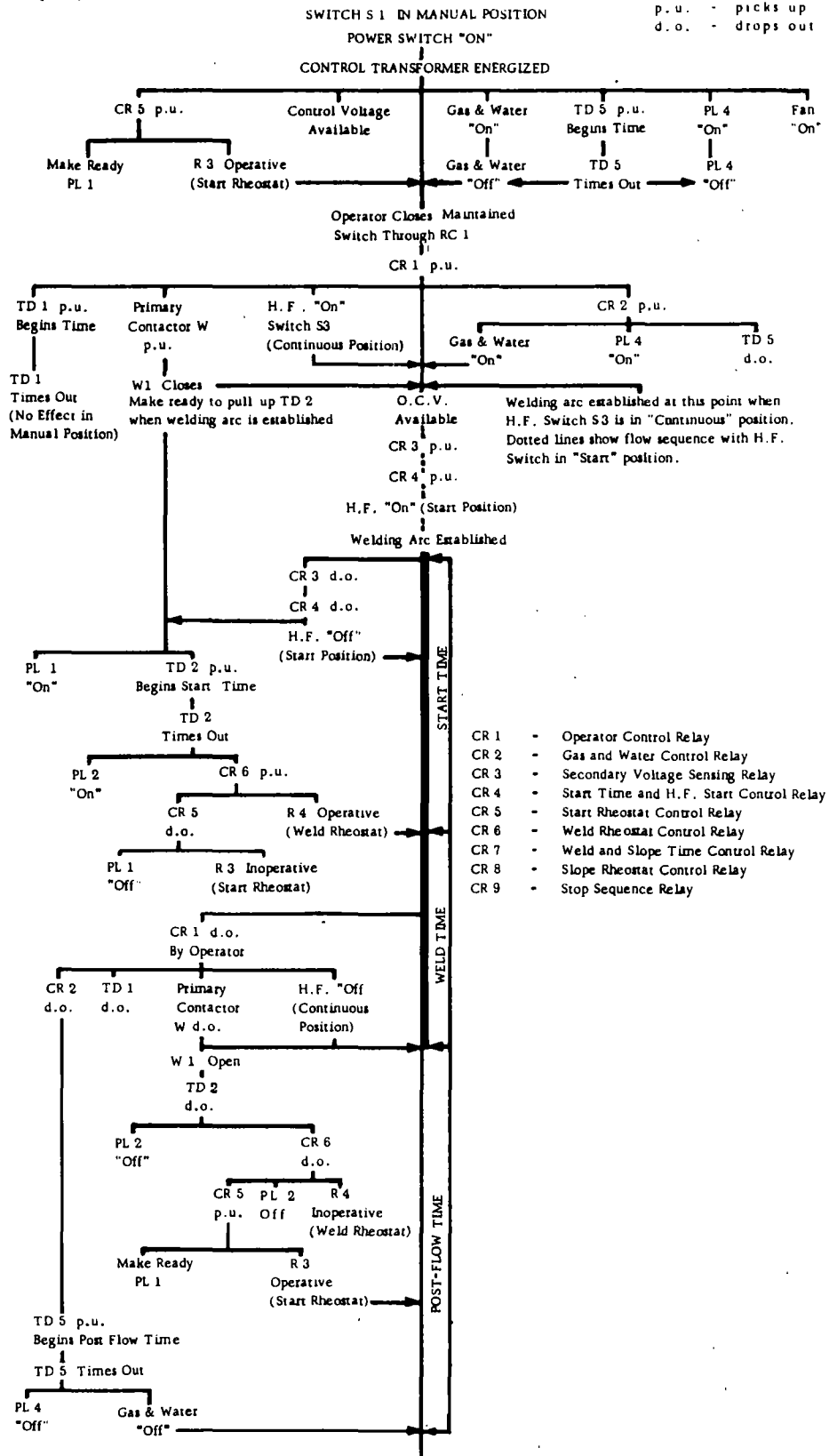


Figure 4-3. SCM/SCE-3A Sequence Flow Chart - S1 In Manual Position

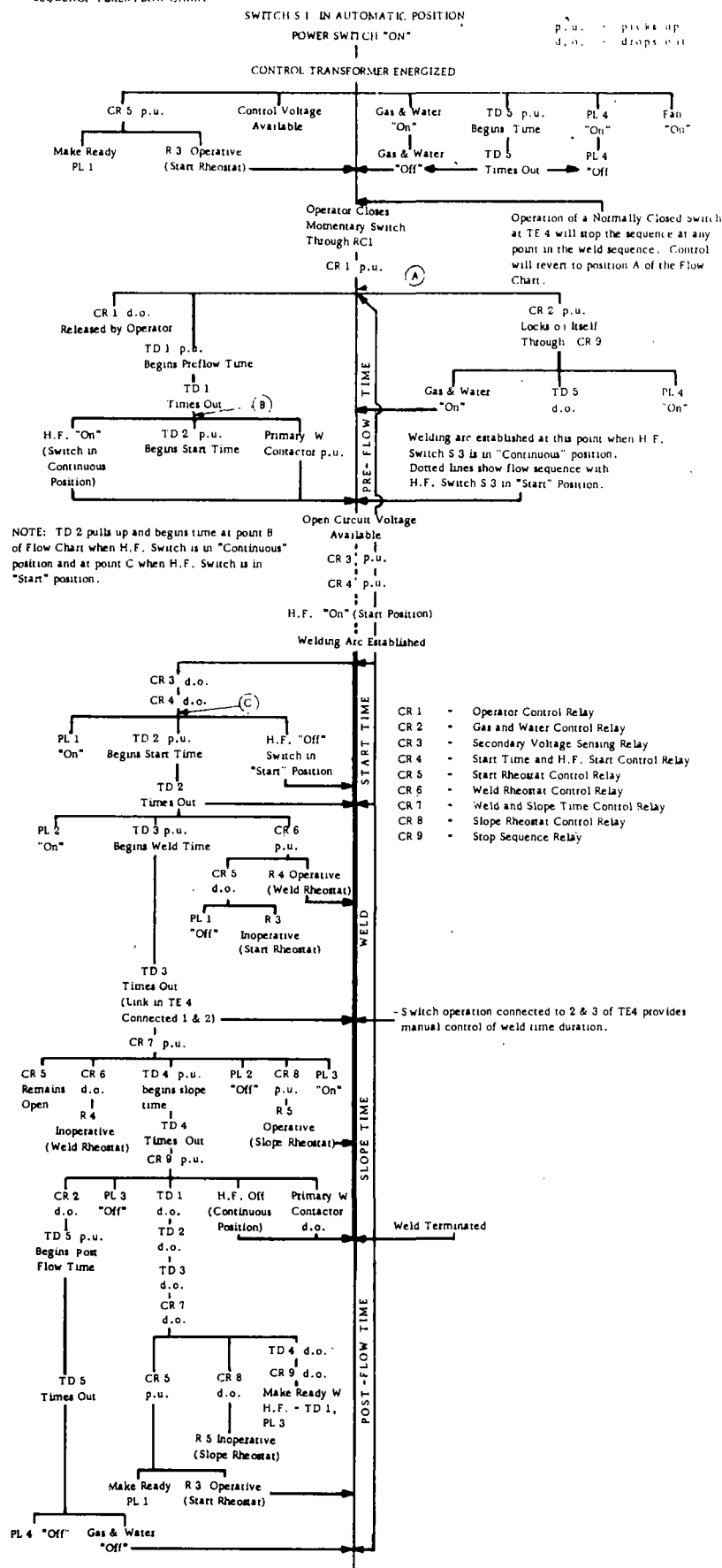
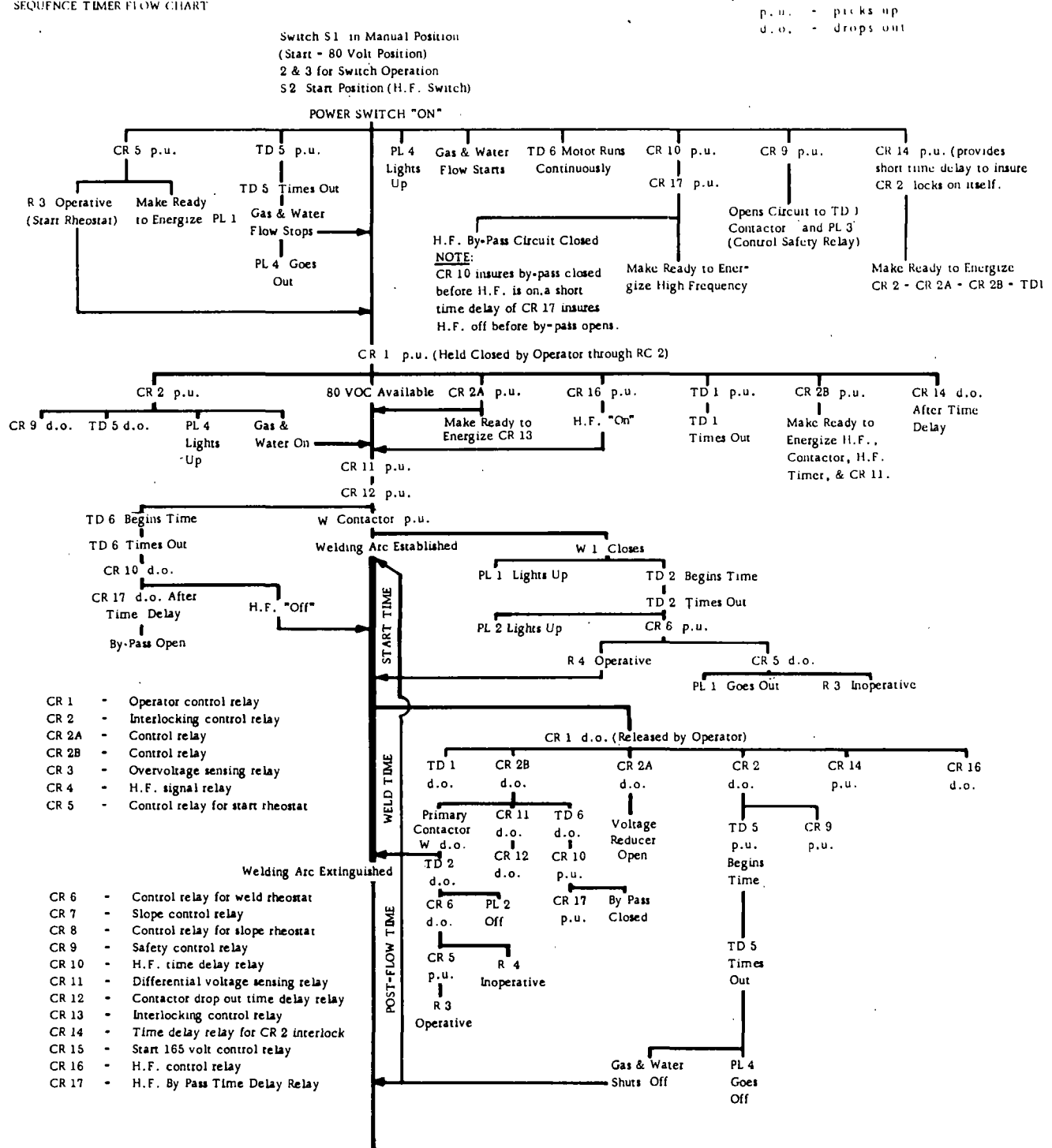


Figure 4-4. SCM/SCE-3A Sequence Flow Chart - S1 In Automatic Position

SCM-5A SCE-5A
SEQUENCE TIMER FLOW CHART



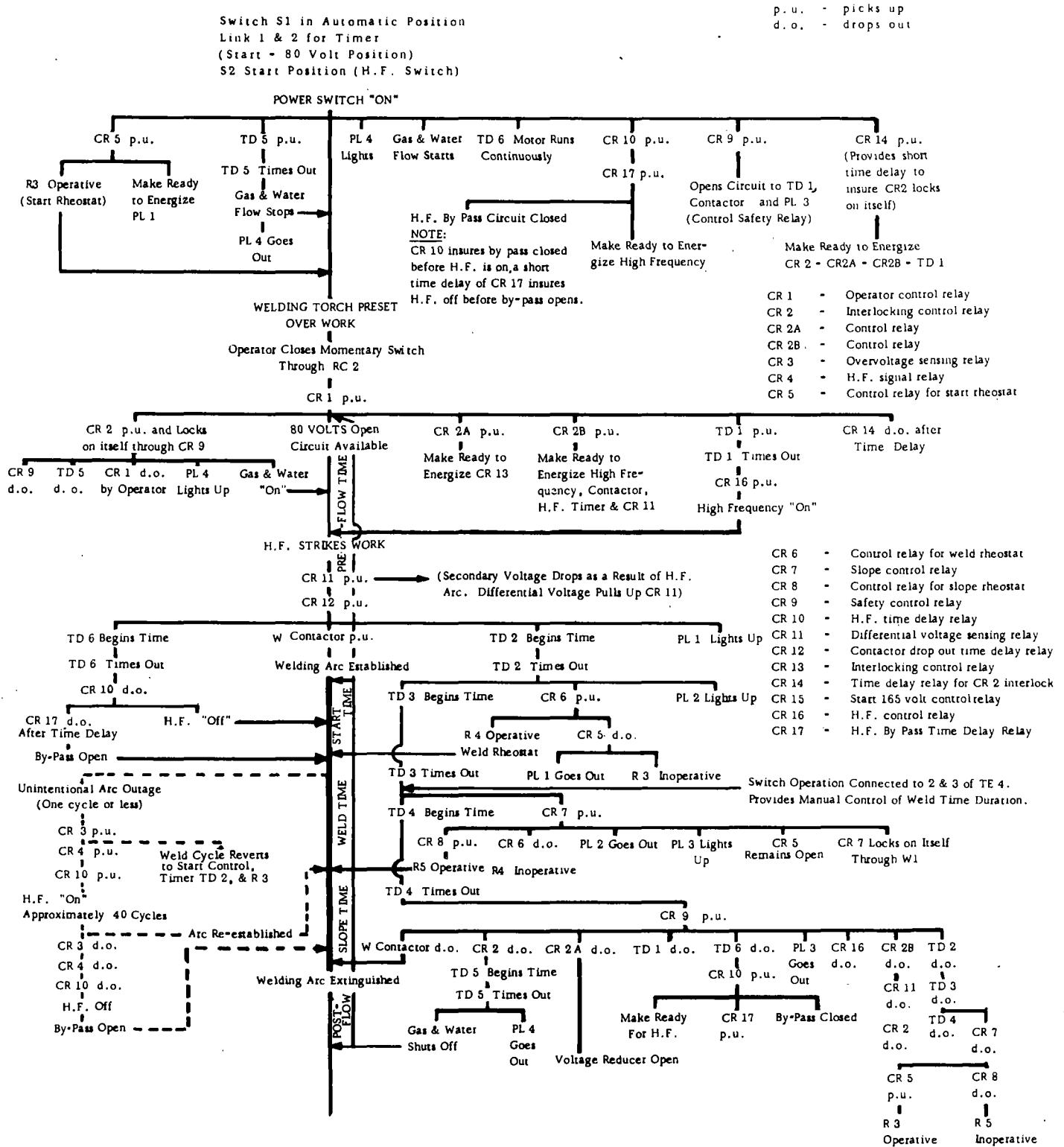


Figure 4-6. SCM/SCE-5A Sequence Flow Chart - S1 In Automatic Position

SECTION 5 - MAINTENANCE

5-1. MAINTENANCE SAFETY

CAUTION

Be sure the branch circuit, or the main disconnect switch has been opened before attempting any inspection or performing any work inside the welding power source or the sequence control. Placing the power switch on the welding power source in the OFF position does not remove electrical power from the switch terminals.

5-2. HIGH VOLTAGE CAPACITORS

These capacitors require no attention and are rarely a source of trouble. A defective capacitor, however, is evident usually by the housing or evident of oil leakage in certain cases. Any local radio repair shop can readily determine the condition of the capacitors. (If one of the high voltage capacitors should fail, operation may be continued with one capacitor until a new one can be secured.) In order to prevent excessive overload on the remaining single capacitor, the spark gap point setting should be reduced to about .004".

5-3. SPARK GAP

The spark point and air gaps can be inspected by opening the door of the Sequence Control. The spark air gaps are factory set at .008 inch. It will be necessary to readjust the spark air gap setting due to extended operation. Readjustment of the spark air gap is also indicated when intermittent operation of the high frequency is noted. Usually this occurs when the spark air gap setting has increased in excess of .012 inch.

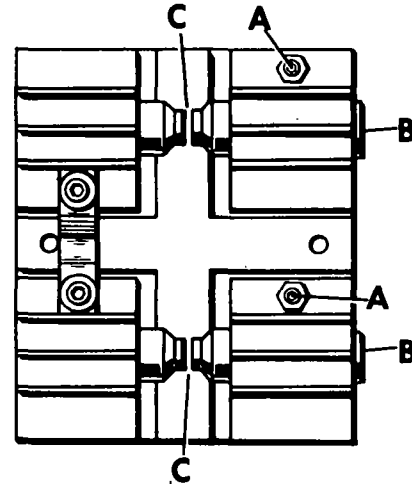
NOTE

Widening of the spark air gaps due to normal operation, may, if not corrected, increase the loading of the high voltage capacitors, thus contributing to their premature failure. Cleaning or dressing the points is not recommended as the material at the gap area is tungsten. The entire point should be replaced when the tungsten section has disappeared.

5-4. SPARK AIR GAP ADJUSTMENT

To readjust the spark air gaps, proceed as follows: (Fig. 4-1)

- Loosen screw (A) on both sides.
- Place an .008 inch feeler gauge in spark air gap area (C).
- Apply slight pressure against spark point (B) so feeler gauge is held firmly between the two points.
- Tighten screw (A).



TA-020 623

Figure 5-1. Spark Air Gap Adjustment

5-5. BY-PASS PANEL

The purpose of the by-pass panel is to reduce the high frequency feedback into the transformer of the welding power source. A defective capacitor in this circuit would reduce high frequency output and might be evident by loss of oil from the capacitor case. If in doubt as to condition of the capacitors, have them checked at a radio repair shop. The resistors in the circuit would show evidence of failure if they are cracked. Failure in this circuit is rare and would be suspected only as a last resort.

SECTION 6 - TROUBLESHOOTING

The data listed here, discusses some of the common problems which may occur in this sequence control. A little thought will probably solve the problem through the information provided.

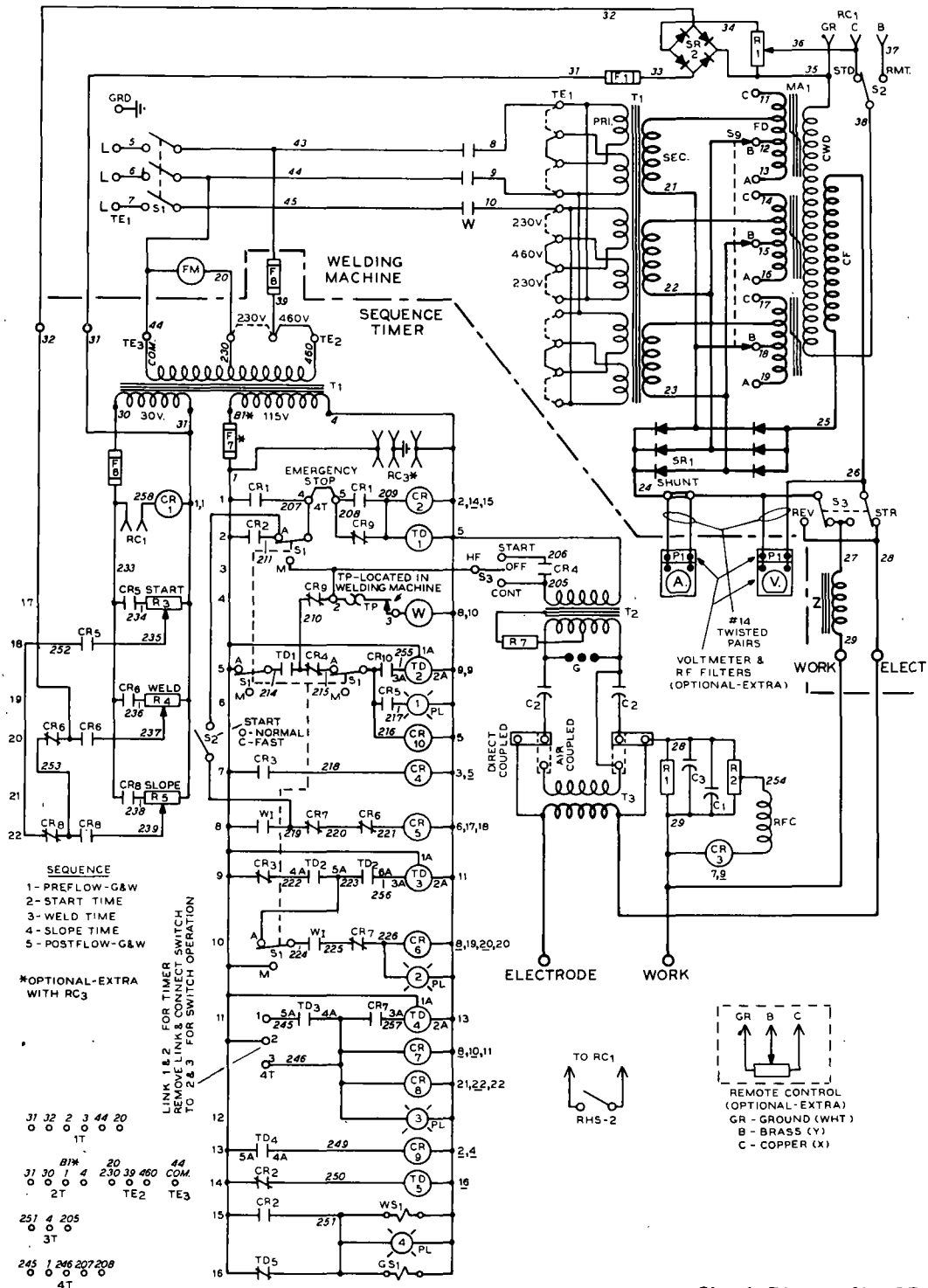
The assumption of this data is that a proper welding condition had been achieved until trouble developed. In all cases of equipment malfunction, the manufacturer's recommendations should be strictly followed.

If after checking the following data the trouble has not been remedied, it is recommended that a serviceman be called.

It is recommended that the circuit diagram be used for reference during troubleshooting.

TROUBLE	PROBABLE CAUSE	REMEDY
Normal output. No high frequency.	Incorrect spark air gap.	Check setting for .008 inch.
	High frequency switch in off position.	Check switch position.
	Shorted high voltage capacitor.	Replace capacitors.
Normal output. Low high frequency.	Incorrect spark air gap.	Check setting for .008 inch.
	High frequency leaks.	Check all connections for high frequency leaks.
	Incorrect direct-air coupling.	Check that both links are connected for the same coupling.
Erratic weld current.	Poor tungsten.	Check tungsten and replace if contaminated.
	Incorrect polarity.	Check polarity.
	Incorrect welding cable size or loose connections.	Check for proper weld cable size (See paragraph 1-2.) Tighten all welding cable connections.
	Poor ground at workpiece.	Check ground connections.

TROUBLE	PROBABLE CAUSE	REMEDY
Contactor pulls in.	Incorrect operating voltage of CR3 relay.	Adjust slider on R2 resistor so CR3 relay pulls in on open circuit voltage.
Weld current does not shut off.	Incorrect operating voltage of CR3 relay.	Adjust slider on R2 resistor so CR3 relay drops out when welding arc is initiated.
Contactor does not pull in.	Blown fuses in control circuitry.	Check fuses.

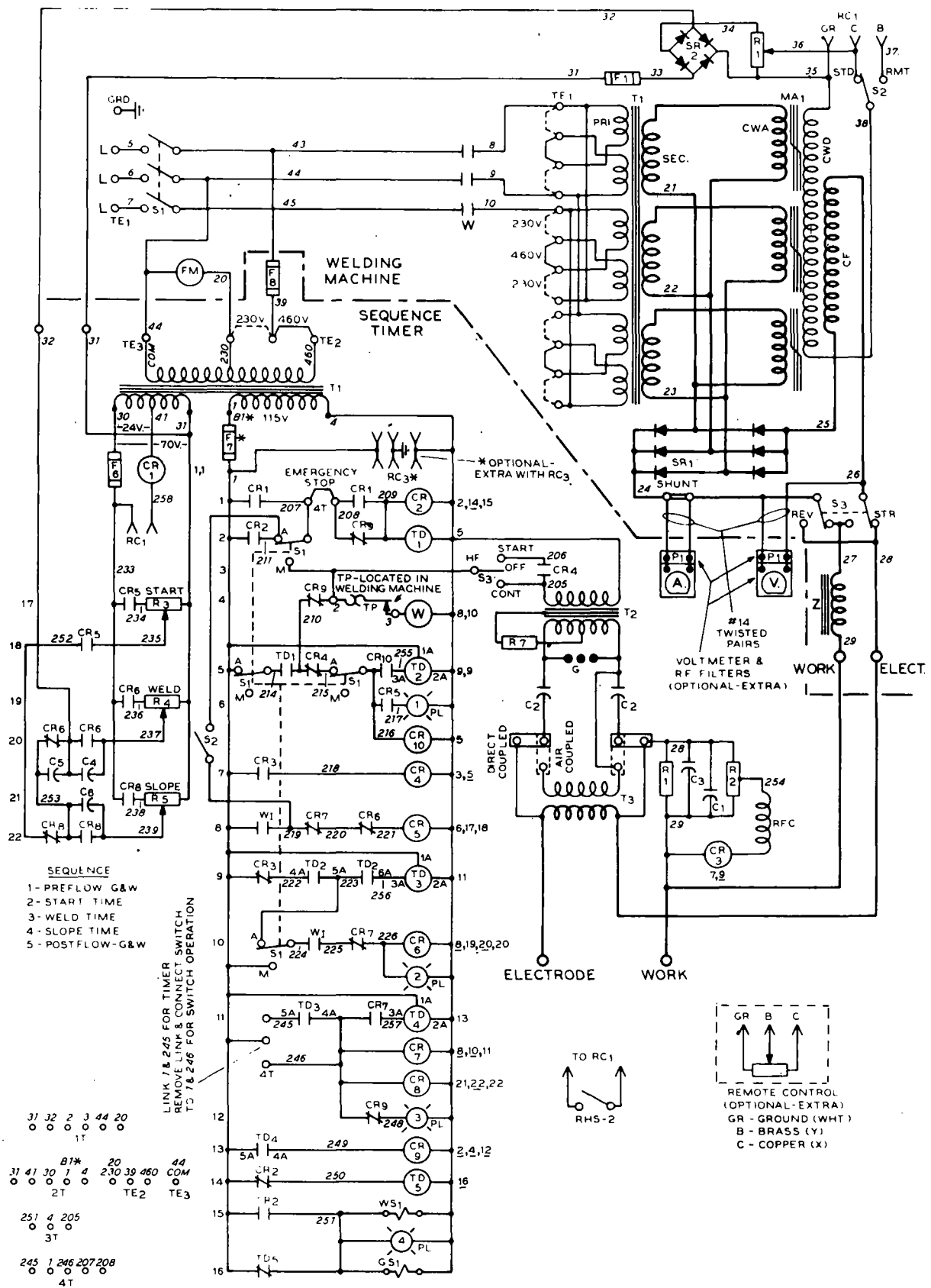


Circuit Diagram No. CB-900 529-13C

Figure 6-1. Circuit Diagram For 200, 300 & 400 Ampere DC Arc Welding Power Source With SCE-1A Sequence Control

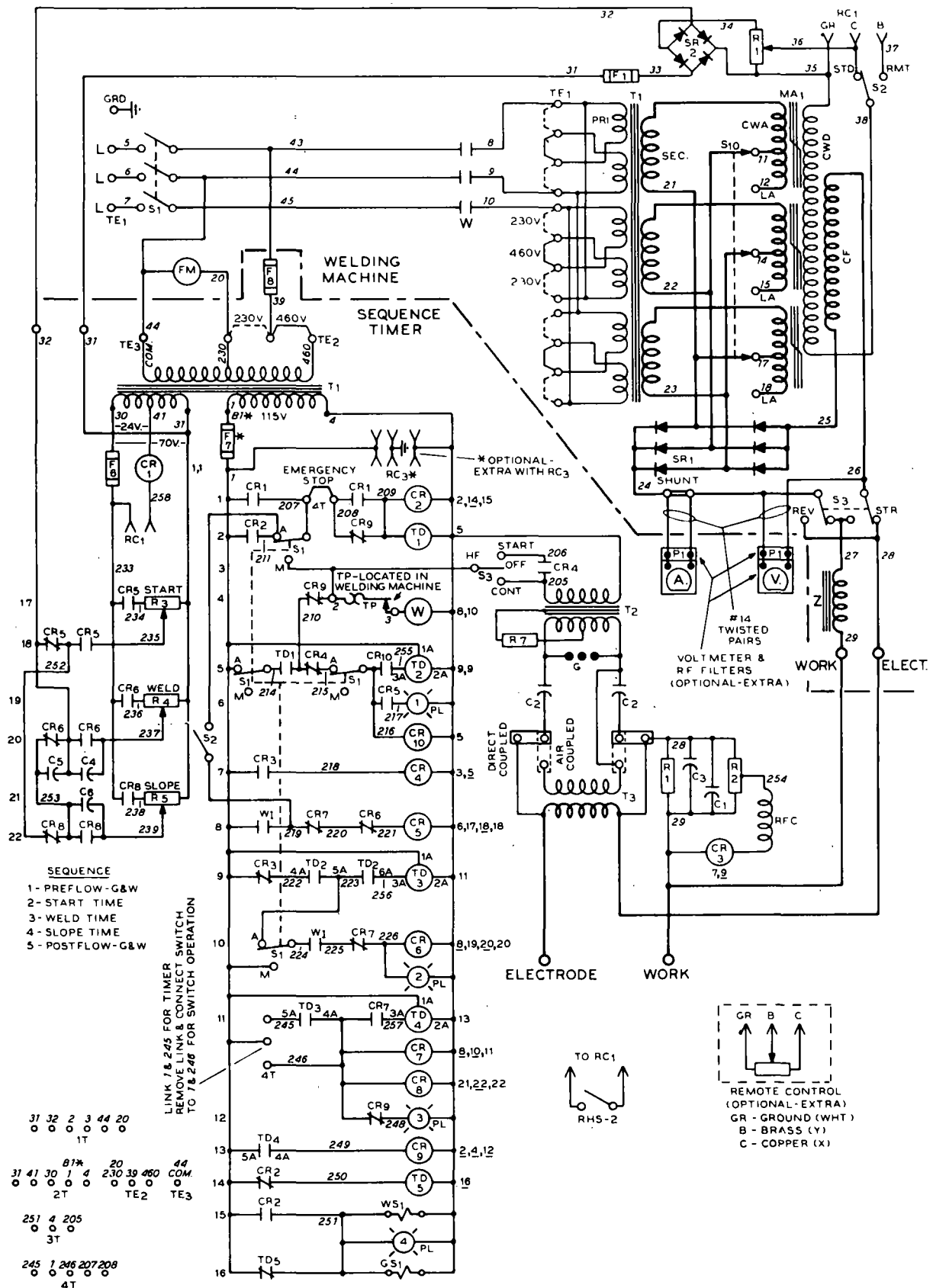


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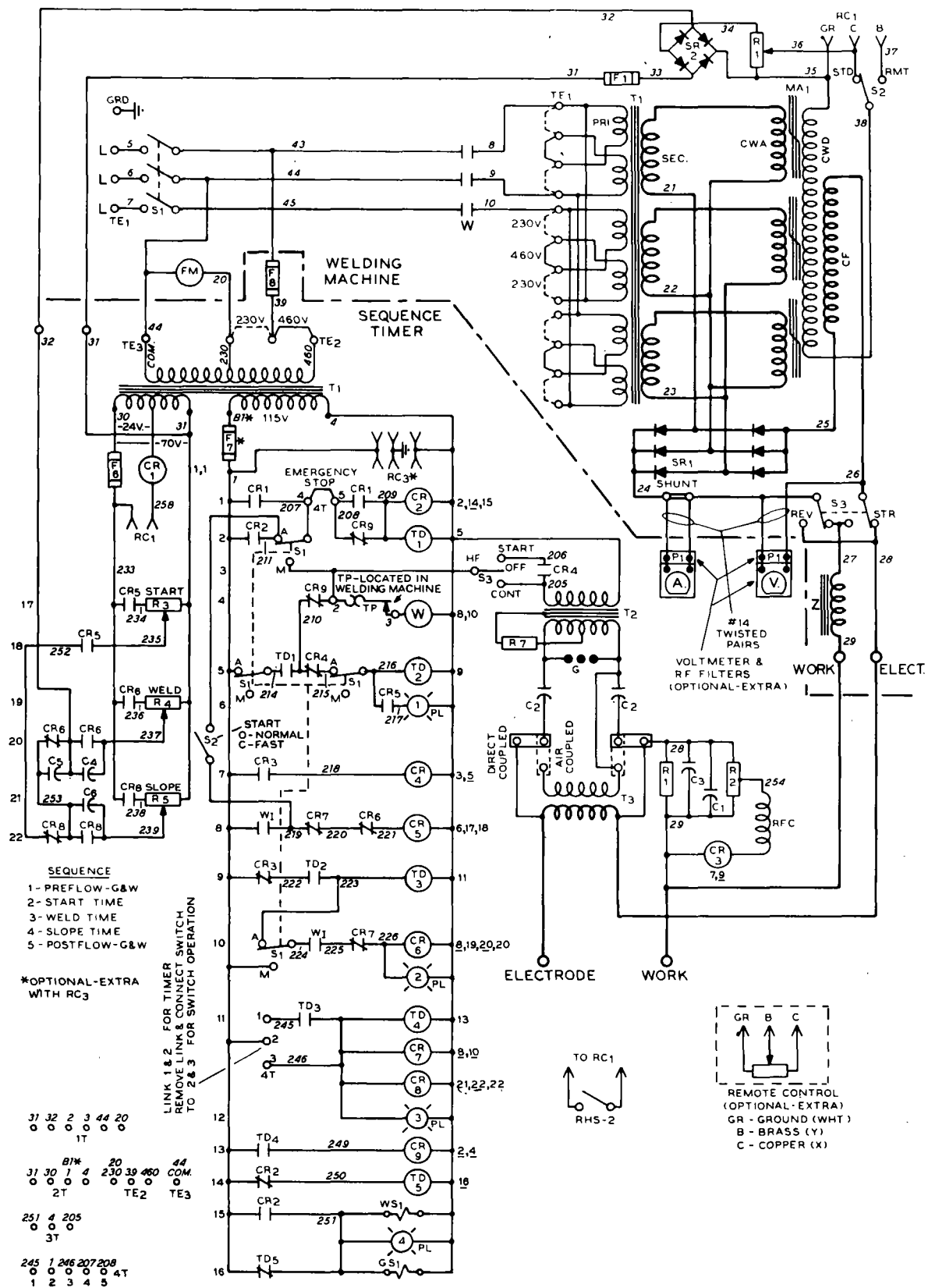
Circuit Diagram No. CB-900 565-3B

Figure 6-3. Circuit Diagram For 200 & 300 Ampere Wide Range DC Arc Welding Power Source With SCE-2A Sequence Control



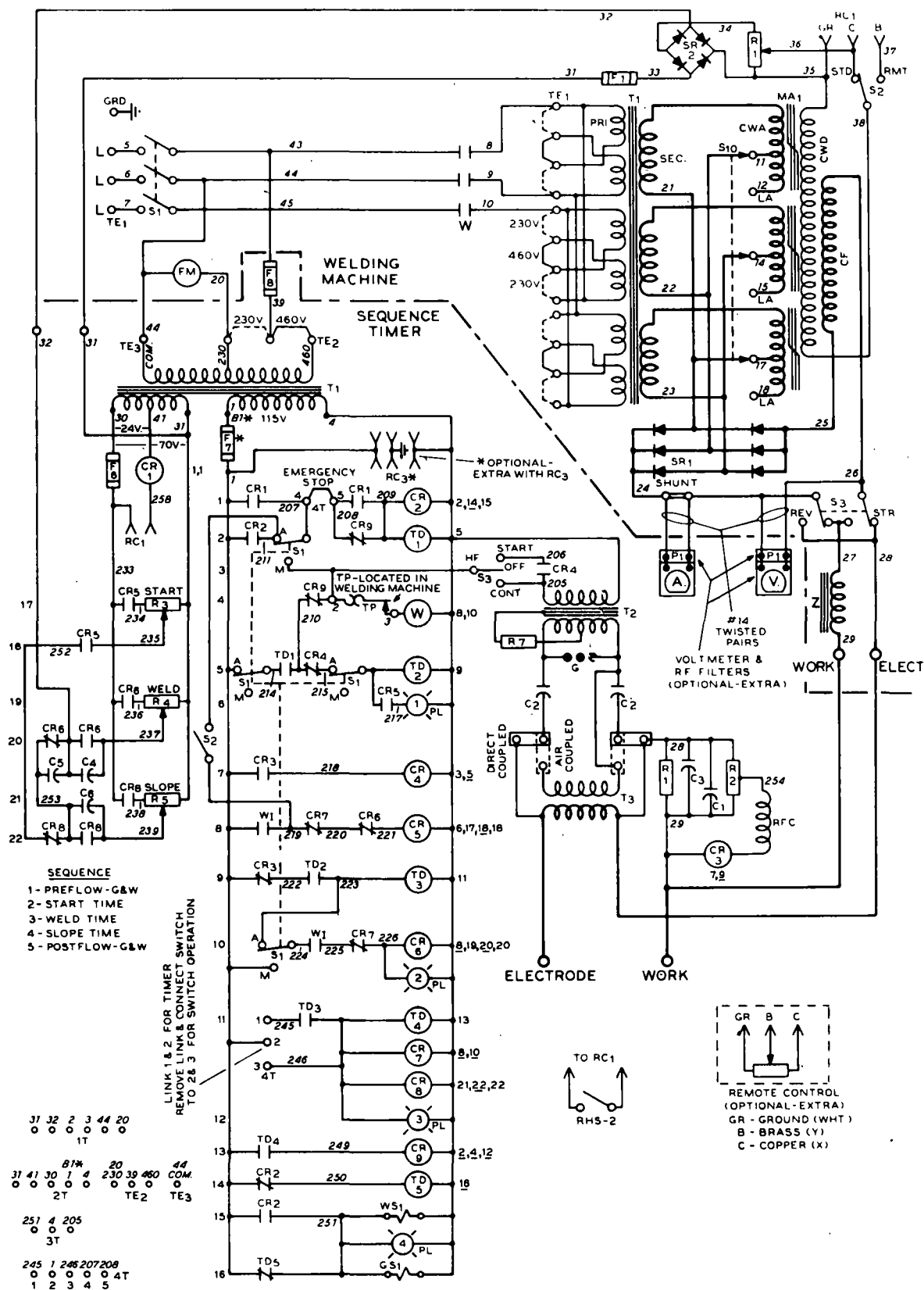
Circuit Diagram No. CB-900 574-4B

Figure 6-4. Circuit Diagram For 200 & 300 Ampere Wide Range Low Ampere DC Arc Welding Power Source With SCE-2A Sequence Control



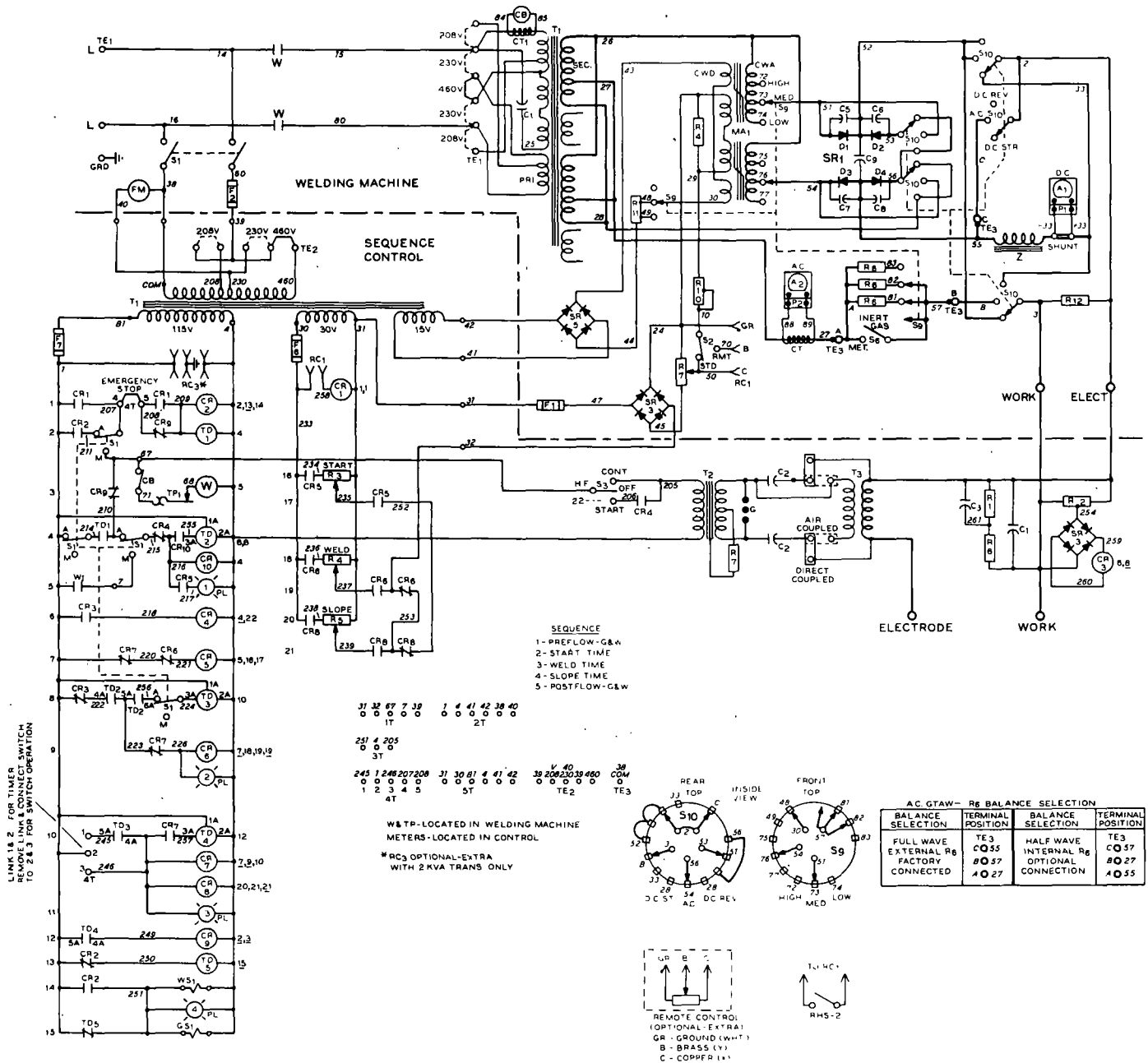
Circuit Diagram No. CB-900 565-6

Figure 6-5. Circuit Diagram For 200 & 300 Ampere Wide Range DC Arc Welding Power Source With SCM-2A Sequence Control



Circuit Diagram No. CB-900 574-3B

Figure 6-6. Circuit Diagram For 200 & 300 Ampere Wide Range Low Ampere DC Arc Welding Power Source With SCM-2A Sequence Control



Circuit Diagram No. CC-901 016-26C

Figure 6-7. Circuit Diagram For 200, 300 & 400 Ampere AC/DC Welding Power Source With SCE-3A Sequence Control

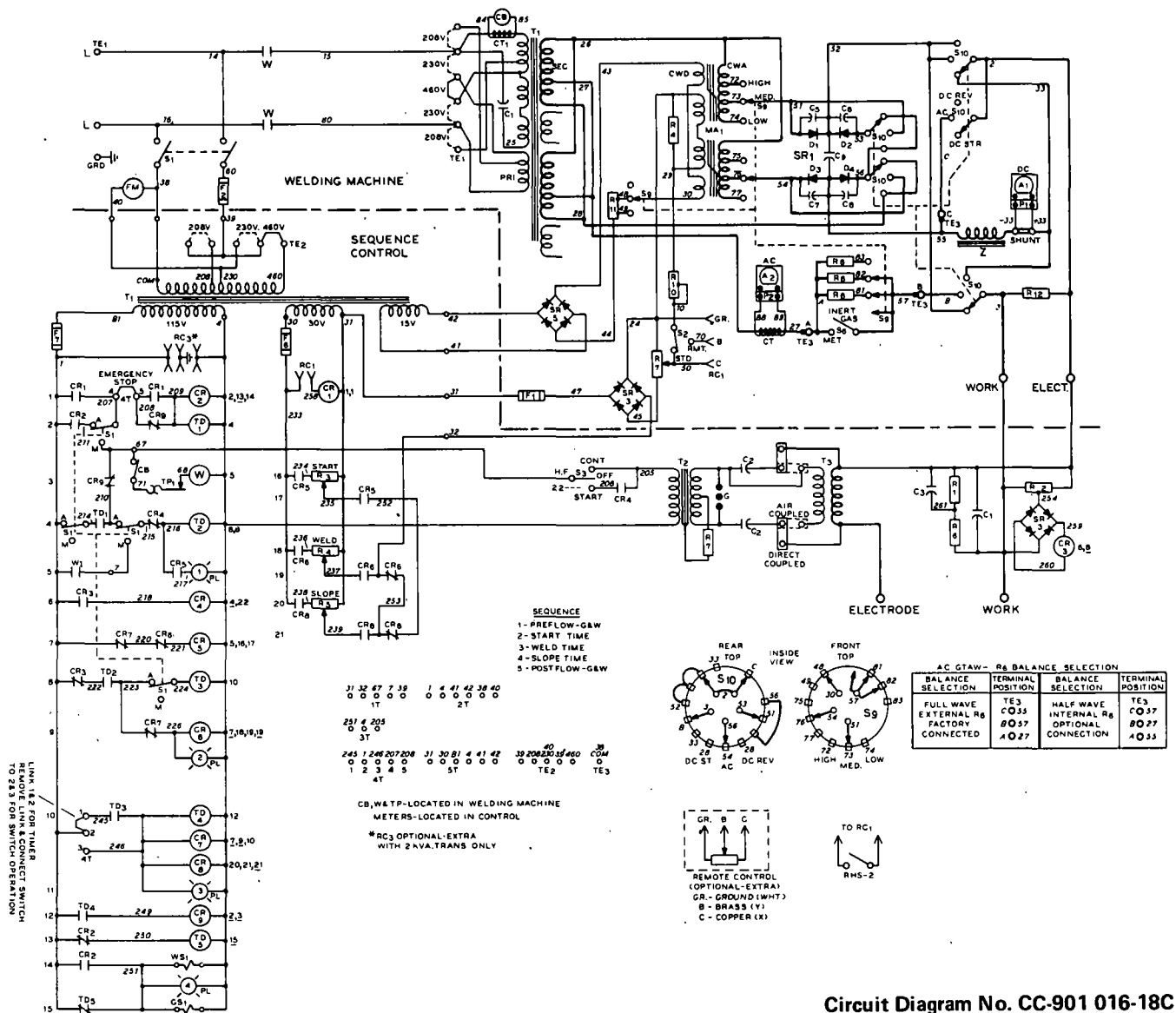


Figure 6-8. Circuit Diagram For 200, 300 & 400 Ampere AC/DC Welding Machine With SCM-3A Sequence Timer



OM-540 Page 21

—SECTION 7 - CERTIFICATION FOR HIGH FREQUENCY ARC WELDING EQUIPMENT—

7 - 1. GENERAL

This following information is necessary to make a proper installation of the high frequency arc welding equipment described in this instruction manual. In order to comply with Part 18 of the Rules and Regulations of the Federal Communications Commission, the certificate in front of this manual must be filled in completely and signed. The certificate must be kept WITH THE EQUIPMENT AT ALL TIMES to comply with the regulation.

The manufacturer of the equipment covered herein has conducted approved field tests and certifies that the radiation can reasonably be expected to be within the legal limits if the correct installation procedures, as outlined, are followed.

The importance of a correct installation cannot be over-emphasized since case histories of interference due to high frequency stabilized arc Welding Machines have shown that invariably an inadequate installation was at fault.

The user of the equipment must complete the certification by stating that he has installed the equipment and is using it, according to the manufacturer's instructions. The user must sign the certification notice appearing in front of this instruction booklet indicating that he has complied with the requirements.

In the event that interference with authorized services occurs, in spite of the fact that the radiation from the welding equipment is within the specified limits, the user is required to take suitable steps to clear the situation. The factory personnel will assist the user by supplying technical information to clear the situation.

In lieu of complying with the installation requirements and the certification of each individual installation, the user may elect to certify his entire plant by having a reputable engineering firm make a plant radiation survey. In such cases, the installation instructions incorporated in this instruction booklet could very well serve as a guide in minimizing interference that might be contributed by the high frequency arc welding equipment.

7 - 2. GENERAL INFORMATION

In a high frequency stabilized arc Welding Machine installation, interfering radiation can escape in four distinct ways as outlined below:

1. Direct radiation from the welding machine. This is radiation that escapes directly from the Welding Machine case. This is very pronounced if access doors are left open and unfastened and if the Welding Machine case is not properly grounded. Any opening in the metal Welding Machine case will allow some radiation to escape. The high frequency unit of this certified equipment is adequately shielded to prevent direct radiation of any consequences if proper grounding is carried out.
2. Direct feedback to the power line. High frequency energy may get on the power line by direct coupling inside the equipment or the high frequency unit, the power line then serving as a radiating antenna.

By proper shielding and filtering, direct coupling is prevented in this certified equipment.

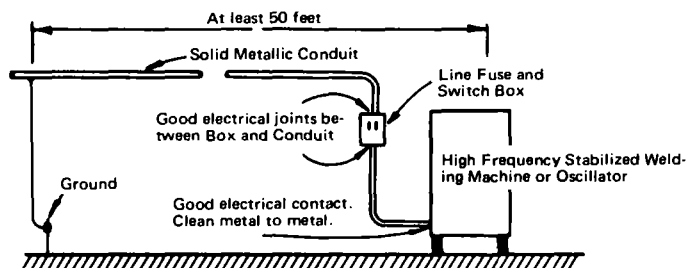


Figure 7-1. Power Service Installation H. F. Stabilized Arc Welding Machine

3. Direct radiation from welding leads. Direct radiation from the welding leads, although very pronounced, decreases rapidly with distance from the welding leads. By keeping the welding leads as short as possible, the operator can do a great deal to minimize interference from the source.

The intensity and frequency of the radiation can be altered over wide limits by changing the location and relative position of the welding leads and work. If possible, loops and suspended sections should be avoided.

4. Pick-up and reradiation from power lines. Even though welding lead radiation falls off rapidly with distance, the field strength in the immediate vicinity of the welding area may be extremely high. Unshielded wiring and ungrounded metallic objects in this strong field may pick up the direct radiation, conduct the energy for some distance, and produce a strong interference field in another area.

This is usually the most troublesome source of interference, but careful adherence to proper installation procedure as outlined in this booklet will minimize this type of interference.

7 - 3. POWER SERVICE

The specific installation instructions for making the proper primary connections to the equipment as outlined in the instruction booklet furnished with the equipment, should be followed carefully with one exception as noted in the following paragraph.

Frequently installation instructions specify that the primary power service shall be run in solid or flexible metallic conduit. Ordinary helically wrapped conduit is designed for mechanical protection and is not suitable for electrical shielding. Only solid metallic conduit or conduit of "equivalent electrical shielding ability" should be used to enclose the primary power service leads.

Solid metallic shielding shall enclose the primary power service to the equipment from a point 50 feet from the equipment in an unbroken run.

This shielding shall be grounded at the farthest point from the equipment and should make good electrical contact with the casing of the equipment. The ground should be in accordance with the specifications outlined in the section entitled "GROUNDS" and as shown in Figure 7-1. Care should be taken that paint or corrosion at the junction of conduit and case, does not interfere with good electrical contact.

There shall be no gap in this shielding run. This simply means that within 50 feet of the equipment, no portion of the power wires serving the equipment shall be unshielded. If there is any question about the electrical efficiency of the joints between individual conduit sections, outlet boxes and the equipment case, bonding should be carried out by soldering a copper strap or wire across the joint as shown in Figure 7-2.

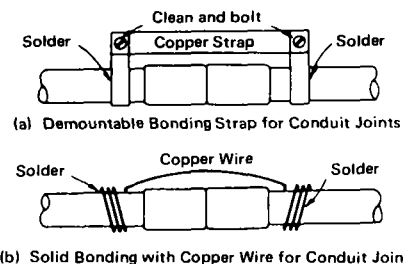


Figure 7-2. Two Recommended Methods For Electrical Bonding Across Poor Conductivity Conduit Joints

7 - 4. WELDING MACHINE

The location of the equipment should be chosen with respect to nearness to a suitable ground connection. The equipment case, firmly bonded to the power conduit, should be grounded to the work terminal of the equipment with a copper cable or braid with rated current carrying capacity equal to or greater than that of the power service wires.

This "work" output terminal of the equipment should then be grounded to a "good electrical ground" (as defined in section entitled "GROUNDS") with a short length of welding cable of the same capacity as the "work lead". (See Figure 7-3).

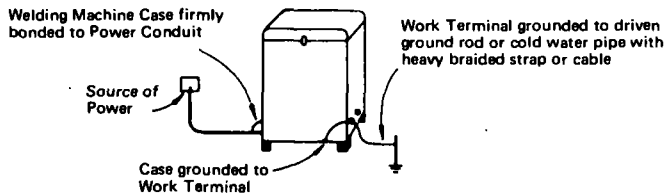


Figure 7-3. Ground Connections At Welding Machine

No change in the wiring or the location of parts inside the equipment, other than power service tap changes or other adjustments specifically covered shall be made. The equipment shall not be modified in any way since changes in the equipment can affect the radiation characteristics and may not be in accordance with the test data upon which the manufacturer bases his certification.

While the equipment is in operation, all access and service doors shall be closed and properly fastened.

Spark gap settings shall be maintained at the minimum separation consistent with satisfactory welding results.

7 - 5. WELDING LEADS

In order to minimize direct weld lead radiation, the welding leads (electrode lead and work lead) must be kept as short as possible. Certification tests on this machine have been made with leads 25 feet long. Considerable improvement in radiation minimization can be had by shortening the leads as much as possible.

Keeping the electrode lead and ground or work lead as close as possible and on the floor serves to reduce the radiation. (See Figure 7-4).

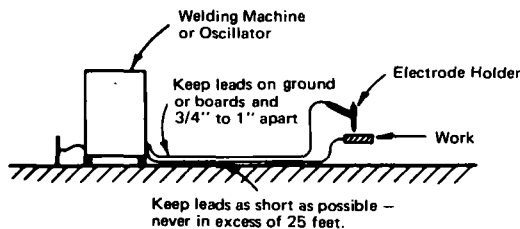


Figure 7-4. General Rules For Welding Leads

7 - 6. WIRING IN THE VICINITY OF THE WELDING AREA

As discussed in the general information section, the most serious source of interference is reradiation from wires that are located near the welding area.

Any ungrounded electrical conductor in the strong "directly radiated" field, produced by the welding leads, serves as a pick-up device and may conduct the interference for some distance and reradiate strongly at another location.

For purpose of simplification and standardization, the space all around the weld zone at a distance of 50 feet in all directions is referred to as the High Field Intensity (H.F.I.) zone. (See Figure 7-5).

To minimize radiation of this type all wiring in the H.F.I. zone shall be in rigid metallic conduit, lead covered cable, copper braid or material of equivalent shielding efficiency. Ordinary flexible helically wrapped metallic conduit, commonly referred to as "B.X." is not satisfactory for shielding, and should not be used. The shield on all wiring should be grounded at intervals of 50 feet and good electrical bonding between sections shall be maintained.

This shielding requirement applies to all wiring, including telephone, inter-communication, signal and control and incidental service.

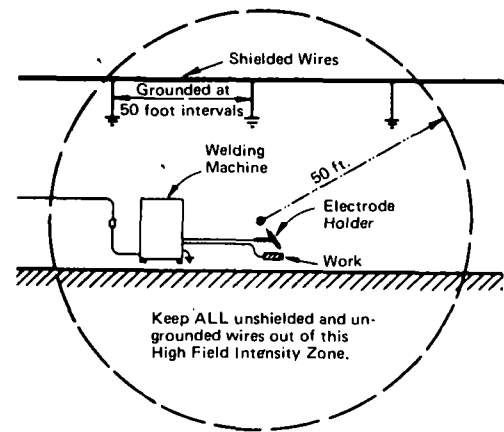


Figure 7-5. General Requirements To Minimize Reradiation Pick-Up In the Vicinity of the Weld Zone

Extreme precaution should be taken to make sure that the location of the zone is chosen so that none of the conditions are voided by unshielded wires off the premises but still within the radial dimensions of the H.F.I. zone.

This 50 foot H.F.I. zone is a minimum that is imposed on the installation. Certification tests by the manufacturer are based on this limit.

Keeping unshielded wires farther than 50 feet from the weld zone will materially aid in minimizing interference.

If it is impossible to relocate unshielded wires, that section within the H.F.I. zone, should be placed in conduit and each end of the conduit section grounded.

NOTE

It must be emphasized that all changes in power and lighting wiring should be made by a qualified electrician and comply with the National Electrical Code requirements. Any shielding or relocation of telephone or signal wires must be done either by the service company concerned or with the specific permission of said company.

7 - 7. GROUNDS

Frequent reference is made to a "good ground" in previous sections. Although there is considerable leeway in the interpretation of this term, for the purpose covered in this booklet the following specifications apply:

A "ground" connection should be made to a driven rod at least 8 feet long and driven into moist soil.

A cold water pipe can be used in place of the ground rod provided it enters the ground within 10 feet of the equipment to be grounded.

All leads connecting the point to be grounded to the ground rod or pipe should be as short as possible since the ground lead itself can become an effective radiating antenna.

The effectiveness of a ground in reducing interference depends upon the ground conductivity. In certain locations it may become necessary to improve the ground conductivity by treating soil around the ground rod with a salt solution.

7 - 8. METAL BUILDING

It is frequently thought that operating of high frequency stabilized arc welding equipment in metallic buildings will completely eliminate troublesome radiation. This, however, is a false assumption.

A metallic building structure, if properly grounded, may serve to reduce direct radiation from the weld zone but will have no effect on conducted interference and reradiation. As a result, all installation requirements necessary for certification must be complied with.

If the metallic building is not properly grounded, bonding to several good electrical grounds placed around the periphery of the building will give reasonable assurance that the building itself is not contributing to the radiation.

7-9. INDIVIDUAL INSTALLATION CERTIFICATION

Any or all of the above installation requirements may be waived by the user if he desires to exercise the option of making an individual field survey of the particular unit installation (or the complete installation if more than one unit is involved), and certifying on that basis.

This survey shall be made by a competent engineer in accordance with the test procedure requirements as set forth in Part 18 of the Rules and Regulations of the Federal Communications Commission.

Surveys of this nature can cover a single unit or multiple units or may include the complete plant structure.

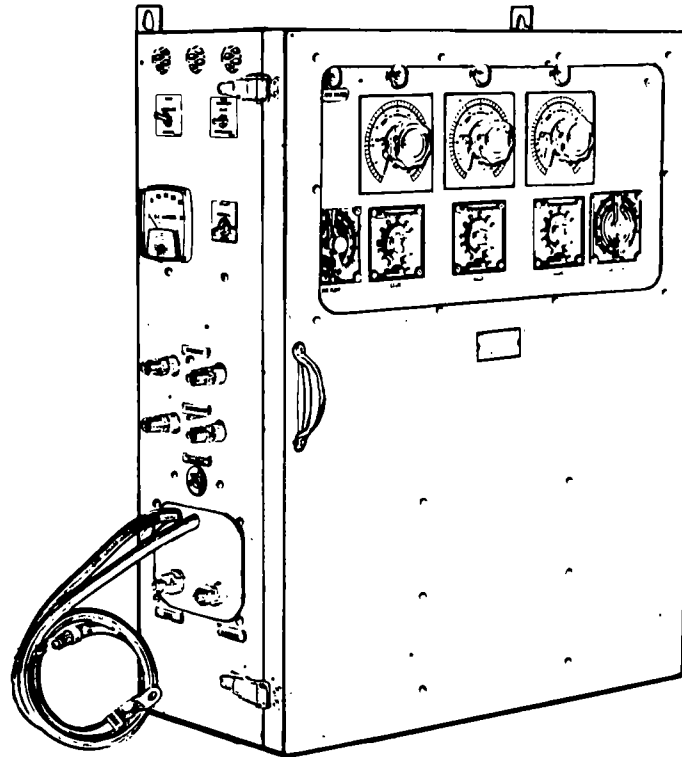
7-10. CHECK LIST

The following questions may be used by the installer as a check to see if all installation requirements have been met:

1. Has the equipment been located so that ground leads can be kept short?
2. Are the power leads, serving the unit, in conduit?
3. Is there good electrical contact between power conduit and case?
4. Do the conduit couplings make good electrical contact? (If in doubt, use bonding).
5. Is there good electrical contact between conduit and switch on service boxes?
6. If rigid metallic conduit is not used, is the shielding used of equivalent shielding efficiency? (Copper sleeving, lead covered cable, etc., is satisfactory. Spirally wound flexible metallic conduit is not suitable).
7. Is the conduit system grounded at a point at least 50 feet from the equipment?
8. Is the conduit run complete (without any gap) in the H.F.I. zone?

9. Is the equipment case connected to the work terminal of the secondary?
10. Is the wire used for this connection of sufficient size?
11. Is the work terminal connected to a good electrical ground?
12. Is the cable or copperbraid used for this connection equal to or greater in current carrying capacity than the welding lead?
13. Is this cable as short as possible?
14. Are the spark-gaps set at .008" or less?
15. Are all service and access doors closed and bolted?
16. Are the welding leads less than 25 feet long?
17. Are they as short as possible?
18. Are the welding leads on the floor or placed on a suitable board?
19. Are the welding leads approximately 3/4" to 1" apart?
20. Have you visualized the H.F.I. zone, a sphere with a 50 foot radius centered on the weld zone?
21. Have the unshielded power and light wires originally in this H.F.I. zone been placed in grounded shields or been relocated outside the zone?
22. Have all large metallic objects and any long guy or supporting wires in the H.F.I. zone been grounded?
23. Have you checked so that no external power or telephone lines off the premises are within the zone?
24. Are the grounds driven ground rods?
25. Is a cold water pipe used as ground?
26. If so, does it enter the ground 10 feet or less from the connection?
27. Are the connections to the ground clean and tight?
28. If operated within a metal building, is the building properly grounded?

If your answer is "yes" to the above questions, you can certify the installation by signing the certificate.



MODEL	STOCK NO.
SCE-1A	040 105
SCE-2A	040 107
SCE-3A	040 109
SCE-5A	040 256
SCM-1A	040 104
SCM-2A	040 106
SCM-3A	040 108
SCM-5A	040 255

MODEL/STOCK NO.	SERIAL/STYLE NO.	DATE PURCHASED

PARTS LIST



MILLER ELECTRIC MFG. CO.
APPLETON, WISCONSIN, USA 54911

Item No.	Dia. Mkgs.	Factory Part No.	Description	SCE or SCM	Quantity Model				
					1A	2A	3A	5A	
Figure A					Main Assembly				
1	TD1,5	034 703	TIMER, 15 second 115 volt ac or						
1	TD1,5	034 704	TIMER, 1 minute 115 volt ac or						
1	TD1,5	034 705	TIMER, 3 minute 115 volt ac or						
1	TD1,5	034 706	TIMER, 5 minute 115 volt ac	Both	2	2	2	2	
2	TD2,3,4	034 703	TIMER, 15 second 115 volt ac or						
2	TD2,3,4	034 704	TIMER, 1 minute 115 volt ac or						
2	TD2,3,4	034 705	TIMER, 3 minute 115 volt ac or						
2	TD2,3,4	034 706	TIMER, 5 minute 115 volt ac	SCM	3	3	3	3	
2	TD2,3,4	++034 847	TIMER, interval-electronic 4.5 sec. or						
2	TD2,3,4	++034 848	TIMER, interval-electronic 9 sec. or						
2	TD2,3,4	++034 849	TIMER, interval-electronic 13.5 sec. or						
2	TD2,3,4	++034 850	TIMER, interval-electronic 18 sec. or						
2	TD2,3,4	++034 851	TIMER, interval-electronic 30 sec. or						
2	TD2,3,4	++034 852	TIMER, interval-electronic 50 sec. (See Fig. C						
			Page 4)	SCE	3	3	3	3	
3	R3,4,5	030 653	RHEOSTAT, WW 150 watt 15 ohm	Both	3		3		
3	R3,4,5	030 622	RHEOSTAT, WW 300 watt 36 ohm	Both		3			
3	R23,24,25	030 653	RHEOSTAT, WW 150 watt 15 ohm	Both				3	
4	PL1,2,3	027 603	LIGHT, indicator-red (consisting of)	Both	3	3	3	3	
5	PL4	027 601	LIGHT, indicator-green (consisting of)	Both	1	1	1	1	
		027 602	. BULB, incandescent base 120 volt	Both	1	1	1	1	
6	S2	*011 609	SWITCH, toggle SPDT 10 amp 125V spade						
			terminal	Both	1	1			

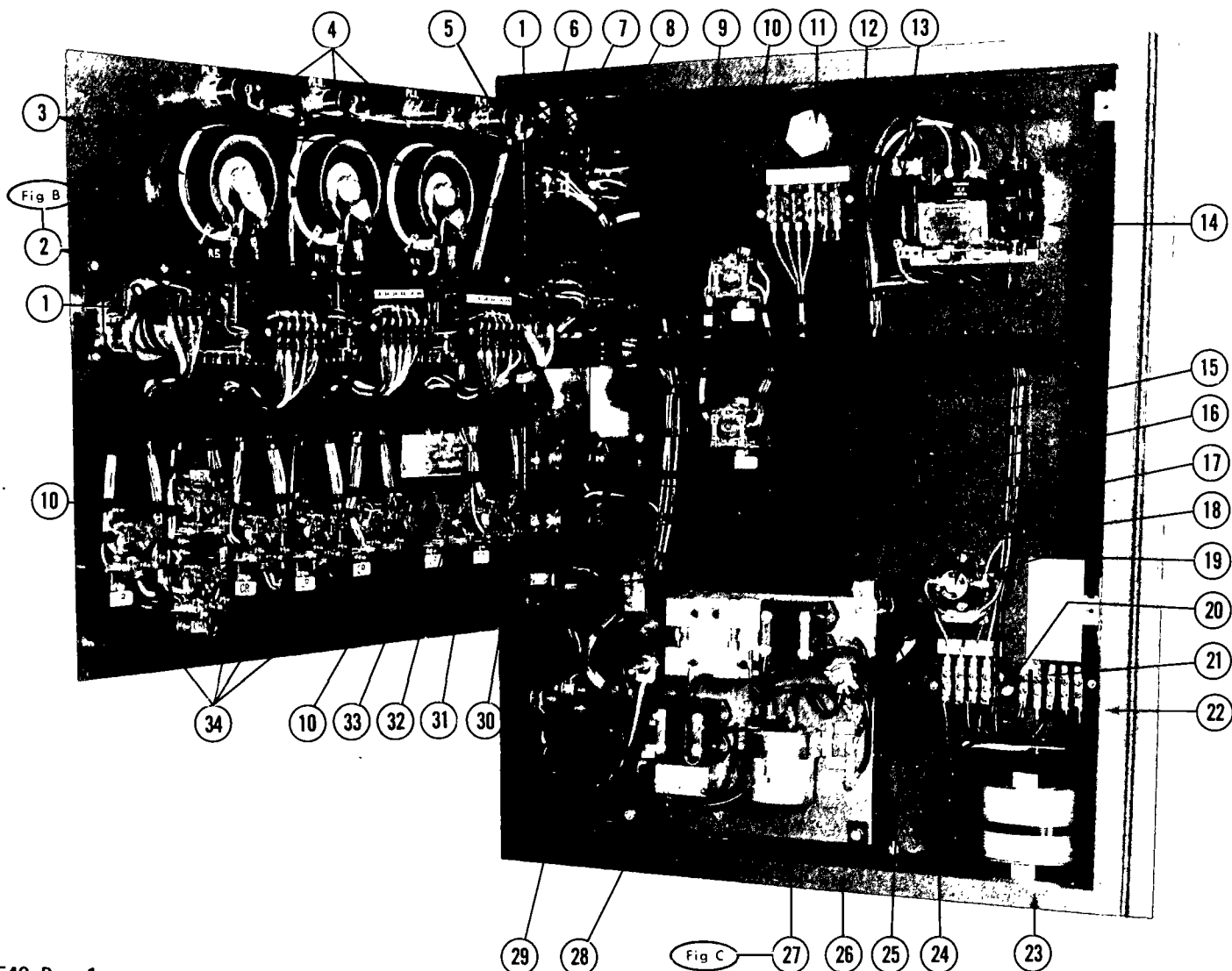
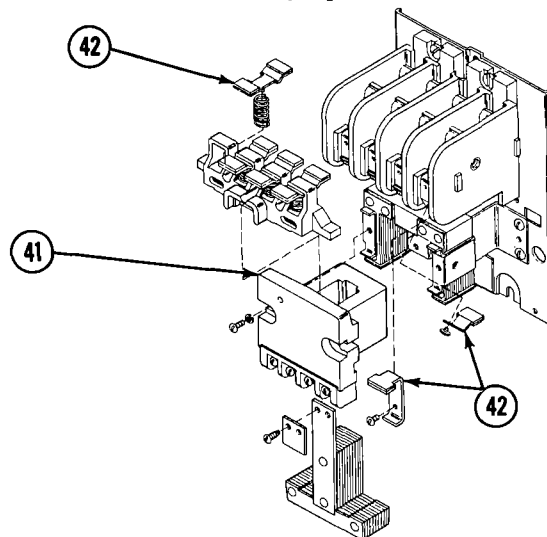


Figure A — Main Assembly

Item No.	Dia. Mkgs.	Factory Part No.	Description	SCE or SCM	Quantity Model			
					1A	2A	3A	5A
Figure A		Main Assembly (Cont.)						
7	S2	*011 610	SWITCH, toggle SPDT (center off) 10 amp 125V apade terminal	Both				1
7	S3	*011 610	SWITCH, toggle SPDT (center off) 10 amp 125V spade terminal	Both	1	1	1	
8	S1	011 624	SWITCH, toggle 4PDT 15 amp 125V screw terminal	Both	1	1	1	1
9	A	025 603	METER, amp DC 50mv 0-300 scale or					
9	A	025 608	METER, amp DC 50mv 0-500 scale or					
9	A	025 611	METER, amp DC 50mv 0-600 scale or					
9	A	025 610	METER, amp DC 50mv 0-800 scale	Both	1	1	1	
9	A	025 625	METER, amp AC 0-300 scale or					
9	A	025 617	METER, amp AC 0-500 scale or					
9	A	025 621	METER, amp AC 0-600 scale or					
9	A	025 618	METER, amp AC 0-800 scale	Both			1	
9	A	025 617	METER, amp AC 0-500 scale	Both				1
	P1	025 701	FILTER, high frequency	Both	1	1	1	1
10	CR2,4,8	034 615	RELAY, medium duty 115 volt AC DPDT	Both	3	3	3	
11		601 156	NIPPLE, chase 1-1/4 inch					
		601 152	NUT, lock 1-1/4 inch	Both	1	1	1	1
12	1T	038 639	BLOCK, terminal 30 amp 6 pole	Both	1	1		
12	1T	038 622	BLOCK, terminal 30 amp 5 pole	Both			1	
12	1T	038 646	BLOCK, terminal 30 amp 10 pole	Both				1
13		034 821	INTERLOCK, contactor normally open	Both	1	1	1	1
14	W	034 820	CONTACTOR, size 1-3/4 3 pole (See Fig. B Page 3)	Both	1	1	1	1
15	CR10	034 615	RELAY, medium duty 115 volt ac DPDT	SCE	1	1	1	
16	GS,WS	035 601	VALVE, 115 volt ac 2 way 1/4 IPS port (consisting of)	Both	2	2	2	2
		033 050	COIL	Both	1	1	1	1
		010 295	ELBOW, brass pipe steel 90 degree 1/4 MPT 5/8-18 LH thread	Both	1	1	1	1
		010 296	ELBOW, brass pipe steel 90 degree 1/4 MPT 5/8-18 RH thread	Both	1	1	1	1
17	RC1	039 602	RECEPTACLE, twistlock 2P2W	Both	1	1	1	1
18	F6	*012 606	FUSE, plug 15 amp 250 volt	Both	1		1	1
18	F6	*012 609	FUSE, plug 20 amp 250 volt	Both		1		
19		012 602	HOLDER, fuse-plug	Both	1	1	1	1
20	2T	038 621	BLOCK, terminal 30 amp 4 pole	Both	1			
20	2T	038 622	BLOCK, terminal 30 amp 5 pole	Both		1		
20	5T	038 639	BLOCK, terminal 30 amp 6 pole	Both			1	
20	2T	038 639	BLOCK, terminal 30 amp 6 pole	Both				1
21		038 620	LINK, jumper-terminal block	Both	1	1	1	
22	TE2	038 602	BLOCK, terminal 30 amp 3 pole	Both	1	1		
22	TE2	038 622	BLOCK, terminal 30 amp 5 pole	Both			1	
	TE3	038 617	BLOCK, terminal 30 amp 2 pole	Both	1	1	1	
23	T1	036 618	TRANSFORMER, 1/2 kva	Both	1			
23	T1	036 272	TRANSFORMER, 1/2 kva	Both		1		
23	T1	036 629	TRANSFORMER, 1/2 kva				1	
24		101 800	TUBING, steel 5/8 OD x 18 Ga Wall x 5-1/4	Both	2	2	2	
25		601 119	CLIP, jiffy-conduit 1/2 inch	Both	2	2	2	
26		018 849	BRACKET, mounting RH - HF panel	Both	1	1	1	
		018 848	BRACKET, mounting LH - HF panel	Both	1	1	1	
27		020 636	HF PANEL (See Fig. D Page 6)	Both	1	1		
27		020 638	HF PANEL (See Fig. D Page 6)	Both			1	
28		018 850	ANGLE, mounting-HF panel	Both	2	2	2	
29		038 642	TERMINAL ASSEMBLY, power output (consisting of)	Both	1	1	1	
		038 945	TERMINAL BOARD	Both	1	1	1	
		038 982	STUD, brass 1/2-13 x 2-5/8 center drilled	Both	2	2	2	
		010 912	PIN, spring carbon steel 1/8 x 3/8	Both	2	2	2	
		604 247	WASHER, flat steel 1/2 SAE	Both	2	2	2	
		602 217	WASHER, lock external tooth 1/2 inch	Both	2	2	2	
		601 840	NUT, hex brass 1/2-13 jam	Both	6	6	6	
		601 839	NUT, hex brass 1/2-13 full	Both	4	4	4	
		018 851	PLATE, cover-opening terminal	Both				1
30	CR1	034 619	RELAY, medium duty 24 volt ac DPDT	Both	1	1	1	
30	CR1	034 666	RELAY, medium duty 24 volt ac 3PDT	Both				

Item No.	Dia. Mkgs.	Factory Part No.	Description	SCE or SCM	Quantity Model			
					1A	2A	3A	5A
Figure A		Main Assembly (Cont.)						
31	CR3	034 601	RELAY, medium duty 24 volt dc DPDT	Both	1	1	1	
31	CR3	034 607	RELAY, medium duty 110 volt dc 3PDT	Both				1
32	R2	030 617	RESISTOR, WW adj 25 watt 2000 ohm	Both	1	1	1	
32	R21,22	030 617	RESISTOR, WW adj 25 watt 2000 ohm	Both				2
33	RFC	033 609	CHOKE, HF	Both	1	1		
34	CR5,6,7,9	034 613	RELAY, medium duty 115 volt ac 3PDT	Both	4	4	4	
	C4,5,6	031 606	CAPACITOR, paper-oil 1 uf 400 volt	Both		3		
	C21,22,23	031 610	CAPACITOR, electrolytic 40 uf 400 volt dc . . .	Both				3
	C24	031 611	CAPACITOR, electrolytic 5 uf 150 volt dc	Both				1
	CR2,2B,4,7,8,13,15,16	034 615	RELAY, medium duty 115 volt ac DPDT	Both				8
	CR,2A,5,6,9	034 613	RELAY, medium duty 115 volt ac 3PDT	Both				4
	CR10	034 607	RELAY, medium duty 110 volt dc 3PDT	Both				1
	CR11	034 601	RELAY, medium duty 24 volt dc DPDT	Both				1
	CR12,14,17	034 612	RELAY, medium duty 110 volt dc DPDT	Both				3
	CR18	034 615	RELAY, medium duty 115 volt ac DPDT	SCE				1
	F7	+*012 606	FUSE, plug 15 amp 250 volt	Both	1	1	1	
	F7	†012 602	HOLDER, fuse - plug 250 volt	Both	1	1	1	
	F8	012 639	FUSE, cartridge 6 amp 600 volt	Both	1	1		
	F8	012 638	HOLDER, fuse - cartridge 600 volt	Both	1	1		
	R26,27							
	28,29	030 615	RESISTOR, WW fixed 25 watt 1000 ohm	Both				4
	SR3	037 568	RECTIFIER, signal (consisting of)	Both			1	
	SR21,22							
	23,24,26	037 568	RECTIFIER, signal (consisting of)	Both				5
		102 363	. BRACKET	Both		2		2
		601 242	. INSULATOR	Both				1
	SR25	037 616	RECTIFIER, signal	Both				1
	4T	038 622	BLOCK, terminal 30 amp 5 pole	Both	1	1	1	1
	3T	038 602	BLOCK, terminal 30 amp 3 pole	Both	1	1	1	
	3T	038 617	BLOCK, terminal 30 amp 2 pole	Both				1
		038 620	LINK, jumper-terminal block	Both	2	2	2	2



TB-034 820

Figure B — Contactor

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure B 034 820 Contactor (See Fig. A Page 2 Item No. 14)				
41		033 410	COIL	1
42		*034 825	KIT, contact points	4

*Recommended Spare Parts.

†Optional Parts.

++When ordering timers be sure to specify time value of timer.

BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity Timers					
				4.5 Sec	9 Sec	13.5 Sec	18 Sec	30 Sec	50 Sec
Figure C			Timer, Interval-Electronic (See Fig. A Page 1 Item No. 2)	034 847	034 848	034 849	034 850	034 851	034 852
51	CR1 F1	104 045	BRACKET, mounting-socket	1	1	1	1	1	1
52		039 663	SOCKET, relay-8 pin	1	1	1	1	1	1
53		034 816	RELAY, enclosed medium duty 120 volt ac DPDT	1	1	1	1	1	1
54		*012 652	FUSE, miniature glass 1/2 amp slo-blo	1	1	1	1	1	1
55		012 637	HOLDER, fuse	1	1	1	1	1	1
56	T1	038 772	BLOCK, terminal 20 amp 6 pole screw terminal	1	1	1	1	1	1
57		010 116	GROMMET, rubber 3/8 ID x 1/2 hole x 1/16 groove . . .	2	2	2	2	2	2
58		015 384	CHASSIS	1	1	1	1	1	1
59		036 830	TRANSFORMER, power 12 volt secondary	1	1	1	1	1	1
60		012 243	TUBING, nylon .150 ID x .250 OD x 3/8 long	4	4	4	4	4	4
61		034 371	CIRCUIT CARD ASSEMBLY (See Fig. C1 Page 5). (consisting of)	1	1	1	1	1	1
62	C4	604 005	. CAPACITOR, metallized paper 4 uf 150 volt dc	1	1	1	1	1	1
63	V1	027 610	. TUBE	1	1	1	1	1	1
64		027 614	. SHIELD, tube	1	1	1	1	1	1
65		024 366	KNOB, pointer line indicator 1-1/8 OD 1/4 bore	1	1	1	1	1	1
66			NAMEPLATE (order by serial number)	1	1	1	1	1	1
67	R5	028 768	POTENTIOMETER, carbon 2 watt 350K ohm 4.5 sec. .	1					
67	R5	028 769	POTENTIOMETER, carbon 2 watt 750K ohm 9 sec . .		1				
67	R5	028 770	POTENTIOMETER, carbon 2 watt 1 meg ohm 13.5 sec.			1			
67	R5	028 771	POTENTIOMETER, carbon 2 watt 1.5 meg ohm 18 sec.				1		
67	R5	028 772	POTENTIOMETER, carbon 2 watt 2.5 meg ohm 30 sec.					1	
67	R5	028 773	POTENTIOMETER, carbon 2 watt 3.5 meg ohm 50 sec.						1

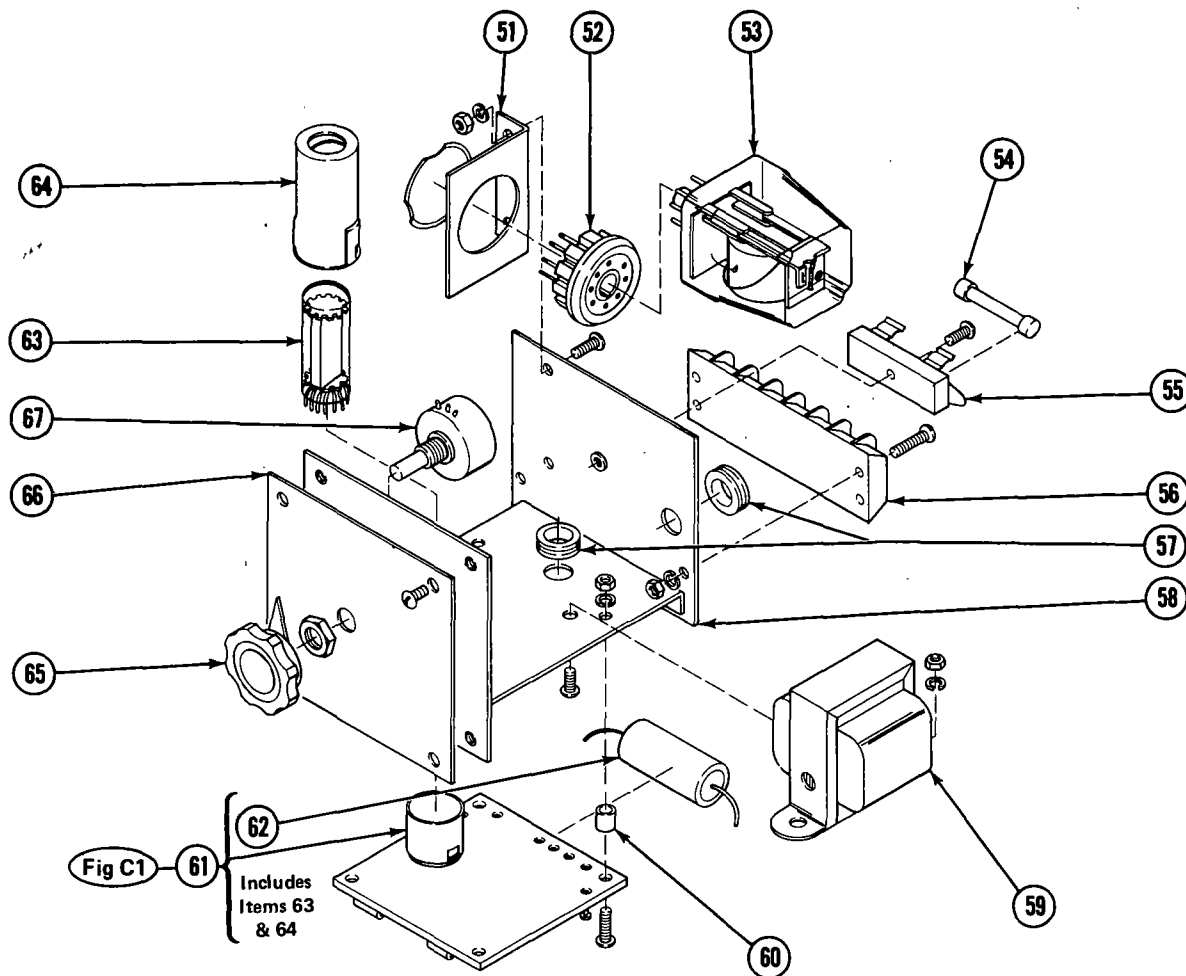


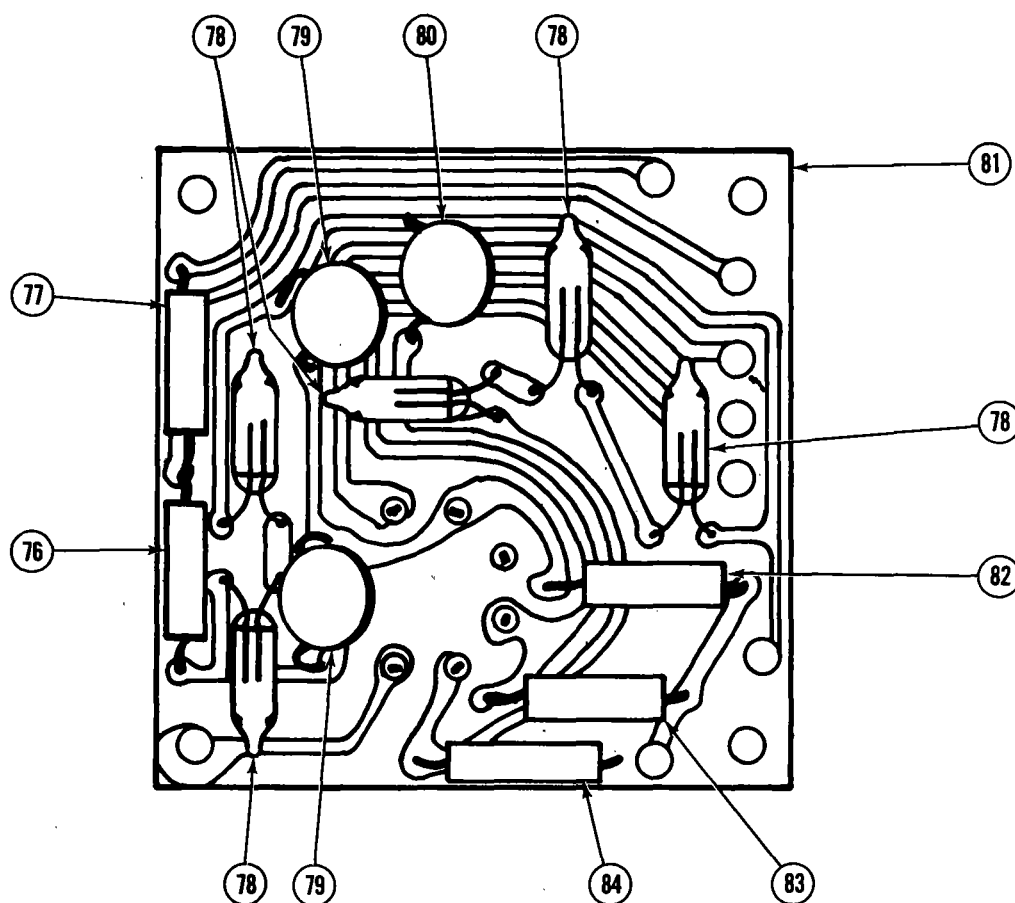
Figure C -- Timer, Interval - Electronic

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*Recommended Spare Parts.

BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mks.	Factory Part No.	Description	Quantity
Figure C1 034 371 Circuit Card Assembly (See Fig. C Page 4 Item No. 61)				
76	R4	030 691	RESISTOR, carbon 1 watt 4700 ohm	1
77	R6	030 720	RESISTOR, carbon 1 watt 10K ohm	1
78	VR1-5	027 611	LAMP, neon	5
79	C1,2	031 637	CAPACITOR, ceramic .02 uf 500 volt	2
80	C3	031 643	CAPACITOR, ceramic .01 uf 500 volt	1
81		038 372	PRINTED WIRING BOARD	1
82	R1	030 722	RESISTOR, carbon 1 watt 22K ohm	1
83	R2	601 394	RESISTOR, carbon 2 watt 10K ohm	1
84	R3	601 395	RESISTOR, carbon 1 watt 120K ohm	1
		039 876	SOCKET, tube shielded 7 pin	1



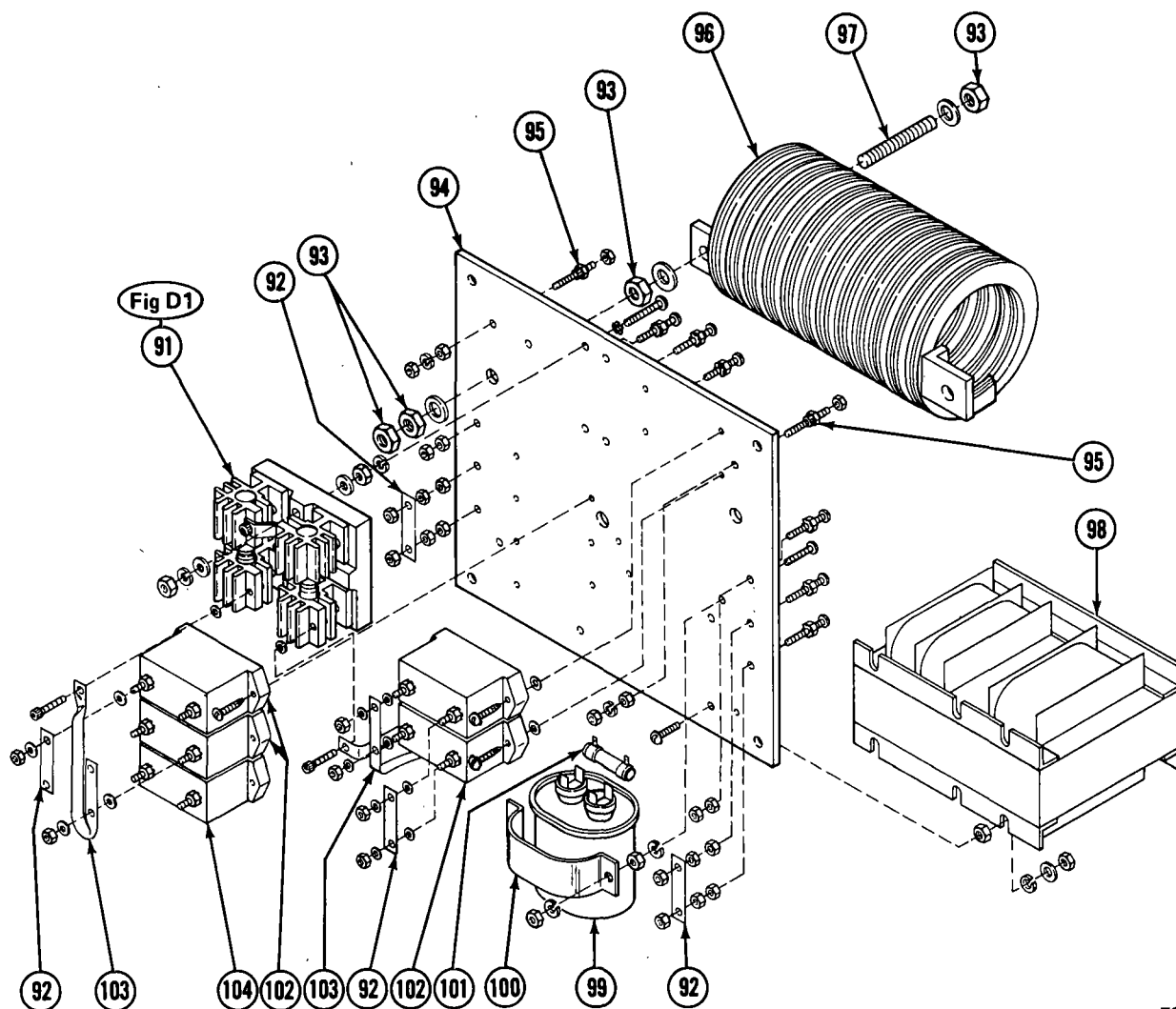
TA-034 371

Figure C1 — Circuit Card Assembly

*Recommended Spare Parts.

BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity	
Figure D			HF Panel (See Fig. A Page 2 Item No. 27)	020 636	020 638
91	G	020 623	SPARK GAP ASSEMBLY (See Fig. D1 Page 7).....	1	1
92		010 886	STRIP, conductor	4	4
93		601 838	NUT, brass - hex jam 3/8-16	8	8
94		016 612	MOUNTING BOARD, component	1	1
95		038 887	STUD, brass 10-32 x 1-3/8 with hex collar	2	2
96	T3	033 601	COIL, coupling	1	1
97		038 891	STUD, brass 3/8-16 x 2-1/8	2	2
98	T2	036 323	TRANSFORMER, high voltage - 115 volt (consisting of)	1	1
	R7	030 724	. RESISTOR, carbon 1 watt 100K ohm	1	1
99	C3	031 601	CAPACITOR, paper-oil 10 uf 600 volt dc	1	1
100		014 159	BRACKET, mounting - capacitor	1	1
101	R1	030 603	RESISTOR, WW fixed 10 watt 10K ohm	1	1
102	C2	031 602	CAPACITOR, mica .002 uf 5000 volt dc	4	4
103		010 884	STRIP, conductor	2	2
104	C1	031 605	CAPACITOR, mica .001 uf 6000 volt dc	1	1
	R6	030 602	RESISTOR, WW fixed 100 watt 10 ohm	1	1

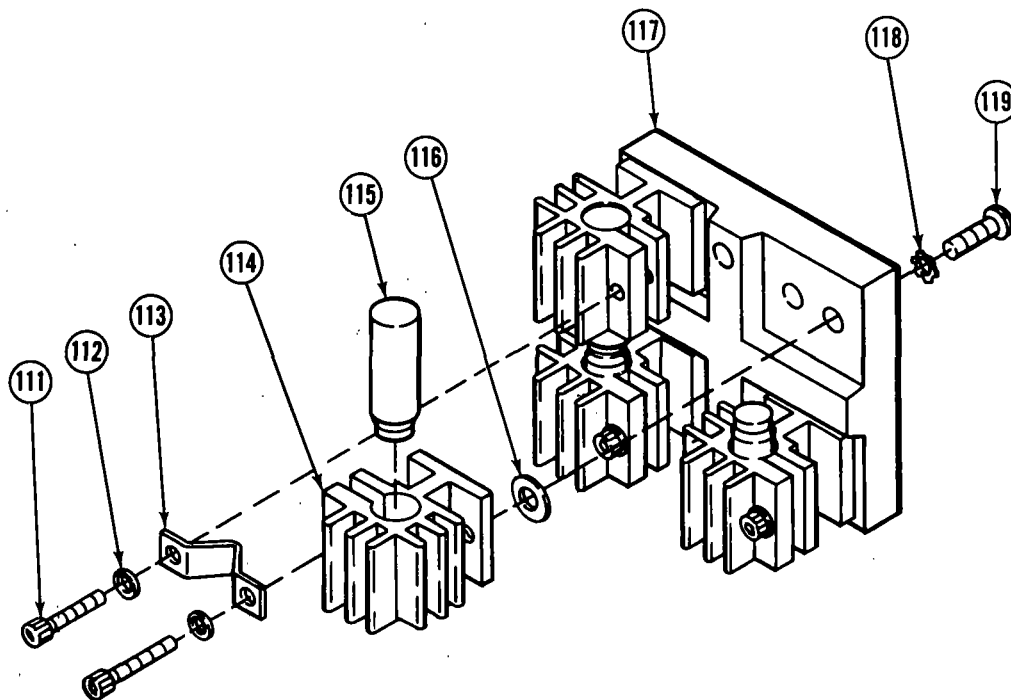


TC-020 636

Figure D - HF Panel

BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

Item No.	Factory Part No.	Description	Quantity
Figure D1	020 623	Spark Gap Assembly (See Fig. D Page 6 Item No. 91)	
111	602 023	SCREW, cap socket head 10-24 x 3/4	4
112	604 772	WASHER, flat steel No. 8 SAE	4
113	010 888	CONNECTOR, holder	1
114	020 622	HOLDER, point	4
115	*020 603	POINT (set of 4)	1 set
116	010 913	WASHER, flat brass 3/16 ID x 1/2 OD	8
117	020 621	BASE	1
118	602 204	WASHER, lock external tooth No. 10	8
119	602 101	SCREW, machine steel round head 10-24-5/8	8



TA-020 623-A1

Figure D1 — Spark Gap Assembly

*Recommended Spare Parts

BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

